W. Penn. Clarke

THIRTIETH CONGRESS—SECOND SESSION.

Ex. Doc. No. 59.

HOUSE OF REPRESENTATIVES.

ANNUAL REPORT

OF THE

COMMISSIONER OF PATENTS,

FOR THE YEAR 1848.

FEBRUARY 28, 1849.

Resolved, That 5,000 copies of the annual report of the Commissioner of Patents with the list of patents and claims annexed, and 40,000 copies of the same report without the list o patents and claims, be printed for the use of the House; and that 500 copies of the former and 1,500 copies of the latter be delivered to the Commissioner of Patents, for the use of the Patent Office, and that the entire number of copies hereby ordered be bound.

WASHINGTON:
WENDELL AND VAN BENTHUYSEN, PRINTERS.
1849.

REPORT

OF

THE COMMISSIONER OF PATENTS.

United States Patent Office,
January, 1849.

Sir: In accordance with the provisions of the act of Congress, entitled "An act in addition to the act to promote the progress of science and the useful arts," approved March 3, 1837, the undersigned has the honor to submit his annual report.

The whole number of applications for patents, received during the year ending December 31, 1848, is sixteen hundred and twenty-eight. The number of caveats filed, during the same period, is six hundred and seven.

The whole number of patents issued during the year 1848, is six hundred and sixty, including twenty-three reissues, three additional improvements, and forty-six designs; classified and alphabetical lists of which, with the names of the patentees and their places of residence, are annexed, marked J and K. But one disclaimer was entered during the same period.

Within the same year six hundred and twenty-six patents have expired, a list of which is annexed, marked L.

There were during the same period nine applications to extend patents, the terms of which were about to expire; seven of these were rejected and two granted. Two patents were also extended during the year by acts of Congress.

The claims embraced in the respective patents issued during the year 1848, are also annexed, marked M.

As a much larger proportion of the applications are rejected than are granted, and as many of the rejected applications may be reconsidered and passed, it is not deemed necessary to notice particularly the action of the office with reference to that class of its business.

The receipts of the office during the year 1848, including duties and fees, paid into the treasury on applications for patents, caveats, reissues, disclaimers, additional improvements, extensions, recording assignments and other papers, and for copies, amount in the whole to the sum of $67,576 69; of which sum $11,529 33 has been repaid on applications withdrawn, and for money refunded which was paid in by mistake, as per statement, marked A.

The expenses of the office during the year 1848, are as follows,

viz: For salaries, $22,584 90; temporary clerks, $7,956 80; contingent expenses, $9,467 65; compensation of the chief justice of the District of Columbia, sitting on appeals from the Commissioner of Patents, $100; library, $1,414 09; agricultural statistics, $2,608 17; printing digest of patents, $1,700; compensation for extra services to E. G. Smith, under the act of Congress for his relief, approved August 5, 1848, $1,000;* amounting in the whole to $46,831 61, as per statement, marked B.

There was also expended during the last year, under the act of March 3, 1837, for the restoration of records and drawings, the sum of $44, as per statement, marked C.

The aggregate of expenditures under the different heads above enumerated, including money refunded on withdrawals and money returned which had been paid in by mistake, is $58,905 84; leaving a balance to be carried to the credit of the patent fund of $8,670 85.

On the first day of January, 1848, the amount of money in the treasury to the credit of the patent fund was $207,797 98. Thus the amount in the treasury to the credit of the patent fund, including the balance paid in during the year 1848, was, on the first day of January, 1849, $216,468 83.

The large balances over expenditures, which have accrued during the last four years, were caused, in part, by the great increase of applications for patents, which accumulated in such a degree as to far exceed the ability of the examining force of the office to dispose of them; thus occasioning a disproportion between the applications and withdrawals, as compared with former years. That cause has been removed by the recent increase of the force of the office, and it may now be expected that until the office is relieved of its accumulated business, the proportion of withdrawals to the receipts of the office will be greater than in former years, and, consequently, the balance which will accrue to the credit of the patent fund will be less.

By the act of Congress, approved May 27, 1848, two principal and two assistant examiners, and two ordinary clerks, were added to the force of the office, and the salaries of the examiners were raised from $1,500 a year to $2,500, and the assistant examiners from $1,250 to $1,500. The clerks authorized by the act before mentioned were allowed salaries of $1,200 each per annum. Thus, the increase of the number of examiners and clerks, and of salaries provided for by the act of May 27, 1848, will occasion an addition to the annual expenditures of the office of $12,900. This amount will be reduced by fees for recording assignments, authorized to be charged by the same act; but the permanent addition to the expenses of the office will not be less than $10,000 per annum.

Notwithstanding this addition to the permanent expenditures of the office, the constant increase of its business and receipts give ample assurance that its revenues will continue to equal, if not ex-

* Allowed Mr. Smith for extra work out of office hours on the agricultural report under Mr. Ellsworth.

ceed, its expenses. But if its revenues should, for a year or two, fall below its expenditures, the patent fund is sufficient to meet such casual deficiency; and thus the policy of Congress, in making the Patent Office a self-sustaining institution, will be successfully maintained.

The two principal and two assistant examiners, provided for by the act of May 27, 1848, were appointed as soon as it was believed that suitable persons had been found for those offices, and they entered immediately upon the discharge of their duties. When they had acquired a sufficient knowledge of the duties of their desks, and had become sufficiently acquainted with the routine of business to begin to render efficient aid to the office, which was not before the first of August, the number of applications on hand awaiting the action of the office was 998. On the first day of January, 1849, that number was reduced to 539, notwithstanding the difficulties which the examining branch of the force of the office were obliged to encounter, resulting from the inexperience of half their number; thus exhibiting a flattering proof of the progress of business, and promising an early relief from the embarrassments under which the office has long labored in consequence of the great amount of business which had accumulated during the last three years, for want of a force in the scientific desks sufficient to dispose of it. A very few months will probably relieve the office entirely from its present embarrassments.

The rigid examinations now made in the Patent Office, with regard to the originality and patentability of new discoveries and improvements, result in the rejection of a much larger proportion of the applications than formerly, when a less scrutinizing system of examination was pursued. Before I assumed the duties of Commissioner, more than half the applications were patented. During the last four years, not quite half of those which have been examined have been patented, and now the proportion of applications patented to those rejected is about two to three.

Within a few years the inventive genius of the country, under some stimulant or other not readily perceived, has been more than usually active, and has produced corresponding results. Formerly, invention was pursued mainly from an ardent desire to develop the laws of nature, and to adapt them by mechanism and by processes to the use of man. Now, it is not only pursued from a love of science and from motives of a noble ambition, but by some as a profession. Hence invention, instead of accomplishing at the present time, by its essays and experiments, as many striking results in proportion to the number of its products as in certain periods of history, applies itself more to improvements in details. It now aims to improve what already exists in a form more or less imperfect, and to adapt itself to the practical wants of society. In short, it has become more utilitarian than it has been in earlier periods. Such, at least, is the conclusion to which I have arrived from very considerable opportunity to observe the progress of invention in this and other countries, during the time I have discharged the duties of Commissioner of Patents.

Yet, it would be very unjust to the inventive genius of the present age to affirm, that every year does not produce great and original inventions, which illustrate the progress of science and add much to the elements of civilization and the improvement of society. But my purpose was more particularly to bring to view the fact that, in consequence of the many improvements in details, much is believed to be discovered which has already been known; and hence a greater proportion of applications for patents, in late years, have been rejected than have been patented.

The reports of the four principal examiners, addressed to the undersigned, and giving a review of the most valuable inventions which have passed their desks during the year, are annexed, marked D, E, F, and G. They are referred to as containing brief but interesting views of the progress of invention and improvement in the mechanic arts in this country during the last year; and, also, as proofs of the intricate and difficult duties which that class of officers are required to perform.

In my three former reports I have taken the occasion respectfully to bring to the attention of Congress the propriety and expediency of amending the present statutes relating to patents, with a view to give more efficient remedies to patentees against the infringements and depredations of "*pirates*," as those individuals are appropriately denominated who make it a business wilfully to invade the rights of the inventor, and appropriate the fruits of his ingenuity and labor to their own use. I have, in my former reports, so minutely pointed out the defects of the present patent system, and so zealously urged their remedy, that it would be but a useless repetition to add more upon that subject than to refer to the views expressed in my reports alluded to.

The experience of every day, and the prolific crop of litigation which has recently sprung up from the unscrupulous and remorseless invasion of the rights of patentees, by persons who have no claim nor pretension to the name of inventor, nor to the fruits of inventive genius, point with impressive force to the necessity of some reform in the existing laws which shall give greater security to the rights vested in patentees. The facilities of evading punishment or retribution for a wilful infringement of the property of patentees is now so great, that the whole term during which a patent runs is not sufficient, if it be for a very valuable invention, to vindicate and establish the just claims of the inventor. This evil could be remedied by a few simple amendments to the existing law of patents.

If a provision were made for the repeal of a patent, and if it were provided that, until it was avoided by process of repeal, the instrument should be received in all actions of infringement as conclusive evidence of the right of the plaintiff to recover, much of the difficulty, expense, and injustice, which now fall upon the patentee, would be avoided. It is, therefore, hoped that Congress will speedily act upon this matter, and thus provide for the protection of a class of men who contribute so much to the convenience,

comforts, and luxury of the community, and to the progress of society in science, art, and civilization.

And surely, the depredator upon the rights of the patentee—rights which are solemnly and sacredly guaranteed to him by law on the condition that he surrenders to the public the secret of his invention—is not entitled to the sympathy, nor the protection of the legislator. The wilful infringer of the rights of the inventor is as base and corrupt morally, as that class of the community known as common thieves. His offence is committed from the same depraved and wicked motive. He is impelled by the same corrupt intent, or *animus furandi*, which actuates the perpetrator of a larceny, and should be hunted from society with the same inexorable perseverance.

Justice, therefore, requires that the *wilful* infringer of patents should be punished with the same rigid severity with which the common thief is punished. But the laws enacted by Congress for the protection of the inventor fall very far short of securing to him this measure of justice. Nor is it asked by him nor in his behalf. He will be content if the title deed of property, which he receives from the government on condition of the surrender of his secret to the public shall be respected, and shall be conclusive as to his rights, until it has been duly set aside by the tribunals of his country, in a proceeding against the patent itself. If his invention were not required to undergo a severe and critical examination, in reference particularly to its novelty and originality, at the Patent Office, there would be some propriety in making his patent merely *prima facie* evidence of title in suits for infringement. But after it has passed such an ordeal, one trial, at least, in a court of justice, had in good faith upon the merits of the invention, should be sufficient to establish its validity, and secure to the patentee an undisturbed enjoyment of his property until the end of the term of his exclusive privilege.

It must be obvious, upon the least reflection, that the best and truest interests of society will be aided and advanced by the adoption of a system of policy with regard to inventors, which will give them adequate security and protection in the enjoyment of their just rights. If they cannot obtain the security and protection to which their genius and labors entitle them, which justice awards to them, and which are promised in the constitution and laws of their country, it requires no sagacity to perceive that discovery in science and improvement in the arts will be greatly checked; for men will not devote their intellects, their toils and their fortunes, to pursuits which promise them injustice, spoliation and poverty, instead of securing for them remuneration, competence and honors.

It has come to the knowledge of the undersigned, since his last report, that one method of evading the rights of patentees in the United States is the setting up of machines in Canada or other neighboring British provinces, where the articles manufactured by such machines are fabricated and thence brought into the United States and sold to the great injury of the American patentee. As the sale of the *products* of a patented machine has been decided by our

courts not to be an infringement of the patent, the patentee has no remedy in the case now under consideration.

The protection, therefore, of our own citizens holding patents under this government would seem to require some legislation for the suppression of these fraudulent practices carried on within the limits of a foreign jurisdiction. A provision authorizing the seizure and forfeiture of all fabrics and manufactures which have been produced in a foreign jurisdiction, by machines protected by patents in the United States, and brought into this country for sale, would probably be an adequate remedy against such a violation of the rights of the American patentee.

In my last annual report, I had the honor to refer the attention of Congress to the expediency of placing the citizens and subjects of foreign governments, applying for patents in this country, on the same ground with regard to fees which our own citizens occupy. Deeming the matter of much importance to the interests of this country, I feel it to be my duty again to bring that subject to the consideration of that honorable body.

At present, the subject of a foreign government who applies to this office for a patent is required to pay the sum of $500, if a subject of Great Britain, and $300 if the subject or citizen of any other foreign power, before his application can be received; while the American citizen is required to pay only $30. It is true that the fees and duties required in most foreign countries are very much higher than those which our laws demand, but they are imposed on all alike, whether subjects or foreigners.

But, even if it were just to make a discrimination in favor of American citizens, with regard to fees, for patents, I am of the opinion that the policy is injurious to the interests of this country, and therefore not expedient. There are in foreign countries many valuable inventions and improvements which are used in secret, for the very reason that the inventors are not able to pay the enormous duties required by their governments for the security of a patent, or are fearful that they will not be protected if they were patented. And many of those inventions would find their way to this country, if their proprietors could introduce them without being burdened with a heavy tax at the outset, before they could try the experiment of their success.

In my judgment, if the foreigner were placed upon the same equal footing with the citizen, with regard to the fees charged upon his application, it would result in a large addition to our stock of useful and valuable inventions and improvements, and better enable our citizens and mechanics to compete with their rivals of other countries. This consideration alone should outweigh the value of the insignificant revenue amounting each year to a few thousand dollars, which is now derived from foreign applications.

Nor would it at all interfere with the rights or interests of the American inventor. The competition of invention is not that which arises from the production of the same descriptions of fabrics, but it exists in a proud and honorable rivalry of efforts to

produce new things which do not interfere with each other, but which are accessions to the stock of invention and art already known and in use. The field of invention is as illimitable as the world of mind and matter, and is now but just beginning to be cultivated. There is, therefore, ample room for all explorers after the valuable treasures, which yet, in rich abundance, lie hidden and undeveloped in its bosom, and which will require the thought and labor of ages to discover and reclaim for the uses of mankind.

I am, therefore, deeply impressed with the belief that the interests of this country would be greatly promoted by encouraging, through the instrumentality of a liberal system of legislation, the inventors and improvers in the arts of other countries, to come here with the productions of their genius and labor, and seek a reward by introducing them into use.

In the patent systems of most countries, encouragment is offered for the introduction of foreign inventions, which have never before been introduced, by granting such persons as may be at the expense, and sometimes danger, of procuring a knowledge of them abroad, and importing them into their native country, a description of patents called "patents of importation." These patents secure to the introducer of the foreign invention rights and privileges similar to those which are enjoyed by original inventors.

Our system contains no provision for the granting of patents of importation; yet, in my experience in the office of commissioner, many instances have come to my knowledge where justice and the public interests required such a reward to enterprising persons who had obtained a knowledge of valuable inventions abroad, which had not been introduced and were not known in this country.

Recently an enterprising citizen of this country applied to the undersigned to know if there was a legal mode of protecting him, for a limited period, in the enjoyment of the art of manufacturing Russia sheet iron, the secret of which he alleged he had obtained. As there was no provision of the existing law which applied to his case, he was referred to Congress as the only department of the government which could give him the protection and reward which he claimed. The secret which he alleged he had obtained is a most valuable one, and I believe is known only to the Russian manufacturer of the article. Its introduction into this country would contribute more to our national wealth than hundreds of ordinary inventions made at home, and therefore, in my opinion, the importer was eminently worthy of a reward in the form of a patent, securing to him the exclusive enjoyment of it for a limited term of years.

Legislation reaching such cases would certainly be founded in wisdom and good policy. Ample provision could be made against fraud or imposition where patents are applied for to protect imported inventions. The importer of the new art or manufacture should, as the inventor now is, be required to disclose his secret, and a rigid examination should be made into its novelty in this and other countries, as is now made with original inventions, before a patent of importation is granted. With such provisions and guards

the new feature proposed may be safely introduced into our patent system.

The undersigned, having had an opportunity during the past year to attend several of the mechanics' fairs which have been held in various cities of the Union, is gratified in being able to bear testimony in favor of the present flourishing condition of the arts in this country. In some branches of the arts and manufactures, the beauty, ingenuity, and skill of workmanship, displayed by our artisans, cannot be surpassed. They may proudly challenge comparison with the products of the most skilful and ingenious of other nations. And what is particularly gratifying, is the fact that every year exhibits a sensible progress in the various departments of mechanical industry, and promises, at no very distant period, to elevate our country to the front rank of nations in the abundance, variety, and perfection of its products, manufactures, and other works of art.

The report of this office upon the condition and statistics of agriculture, during the year 1848, is annexed, marked I.

On reference to the table of the estimated crops, for the year 1848, it will be seen that they exhibit generally a very sensible increase over those of former years. The careful and scrutinising observation of every cause which can affect the growing crops in every section of the country, during the year, which is made at this office, enables me to state that the past year has been very favorable to the growth of the great staples, as well as the minor agricultural products of the Union.

The quantity of wheat raised in the United States during the last year will, according to the estimates of this office, not be less than 126,000,000 bushels. The quantity of corn produced is estimated to be about 588,000,000 bushels; oats, 185,000,000 bushels; potatoes, 114,000,000 bushels; rye, 33,000,000 bushels; buckwheat, 12,500,000 bushels; barley, 6,222,000 bushels; hay, 15,735,000 tons; hemp, 20,330 tons; cotton, 1,066,000,000 pounds; tobacco, 219,000,000 pounds; rice, 119,000,000 pounds; and sugar, (in Louisiana,) 200,000,000 pounds.

Thus it will be seen that the agricultural productions of the Union, during the last year, are ample for the consumption of the country; and of many varieties of grain and provisions, large surpluses will be left for exportation to other countries.

There is, probably, no country in the world whose agricultural industry exhibits a more rapid and steady progress than that of the United States. Its population is rapidly augmenting by natural increase and immigration, and every year large quantities of new land are reclaimed from the wilderness and subjected to cultivation. The number of cultivators and the breadth of soil are fast increasing with each succeeding year; and as Providence yet spares our favored country from the visitations of dearth and famine, which have afflicted less favored countries, the amount of agricultural products must necessarily increase in equal proportion.

Every year adds, also, to the skill of our agriculturists, and to

improvement in agricultural implements; and thus, too, is the amount of production annually augmented.

The minute and searching enquiries which this office causes to be made in relation to the condition and interests of agriculture in every neighborhood in the Union, enable the undersigned to speak positively of the increasing activity and energy of our enterprising and intelligent farmers, and their constant advancement in the knowledge and practice of their transcendant art—transcendant in importance when viewed as the great minister, prolific and efficient in means, to the absolute wants and necessities of man, and the indispensable founation of all civilized communities and nations.

The world has, within comparatively a few years, learned that agriculture offers an almost illimitable field for the operations of the scientific as well as practical experimenter. Its full development seems to require the application of all the physical sciences in some form or other—in the analysis of soils; in the nature, structure and habits of plants; in the food of plants and the adaptation of soils and manures to their sustenance and growth; in the improvement of the races and kinds of animals; in the invention and improvement of useful implements and machines; and finally, in political economy, which points the agriculturist to the contemplation of his interests as they may be affected by the institutions and the legislation of governments. Viewed in this light agriculture may truly be regarded as the most important, dignified, elevated and honorable pursuit in which man can engage. The intellectual qualifications which the cultivation of the science of agriculture requires are therefore not second in degree to those which are necessary for the pursuit of any other science. Hence the importance of study, experiment, and close observation on the part of the agriculturist. All who may be engaged in that elevating and ennobling pursuit, may not have the time nor the opportunity to become thoroughly versed in the philosophy which lies at its foundation, but, in a life devoted to its practice, the humblest will have the time and the opportunity to acquire much interesting and valuable knowledge.

At the last session of Congress an appropriation of $1,000 was made for the institution of a system of analyses of the different grains produced in this country, and of flour manufactured here and exported abroad. The two most important problems which it was deemed desirable to have solved in reference to this matter were, the effect of soil and climate upon the different varieties of grain produced in this country, and the effect of a sea voyage and storage upon the flour and meal manufactured from grain produced here and sent abroad.

For this important work I engaged the services of Professor Beck, of New Brunswick, New Jersey, an experienced analytical chemist, who has been occupied during the past season in the execution of the investigation confided to his charge, and who has submitted to me a most interesting and valuable report, which will be found in the appendix to the agricultural report, marked No. 1.

As there was but little time after the investi tion was author-

ized before it became necessary to commence the work, I had not the opportunity to procure as many samples of grain and flour for experiment as I desired. Yet, a large number of analyses have been made, and the results are embodied in the report of Professor Beck. I am now receiving samples of wheat, corn and flour, from the ports of the most distant countries to which they have been exported; and if Congress shall continue the appropriation necessary for the investigation, more numerous results may be anticipated for the next report from this office.

The investigation in which Professor Beck is now engaged, under my direction, produces not only results of much scientific value, but they will furnish very valuable information to the manufacturers and exporters of flour and grain. It is hoped, therefore, that provision will be made by Congress for its continuance.

Deeming it of importance that a correct historical, statistical and practical view of the great staples of the southern portion of the Union, which form so large a portion of the exports of this country, should be given to the world in an authentic form, I have devised the plan of instituting close and searching investigations into the history, progress and culture, and present condition of the great staples of sugar, cotton, tobacco and rice, which, if circumstances will permit, I shall pursue from year to year until my purpose shall have been attained.

As a commencement of this systen of investigation, I employed an intelligent and able gentleman, Charles L. Fleischman, esquire, to visit Louisiana during the last season, to make inquiry into the condition and progress of the sugar culture in that State. He has accomplished in part the object for which he was sent, and has presented to me a most valuable report, which will be found in the appendix of the agricultural report, marked No. 2.

As the time which was allotted to him for the execution of the investigation committed to his charge was not sufficient to enable him to complete his inquiries, it will be necessary for him to resume his labors during the approaching season. His report, although necessarily incomplete, it is believed contains much valuable information, which will be interesting to the public at large, and particularly to the intelligent and enterprizing citizens who are engaged in the sugar culture in this country.

The circulars sent out from this office, soliciting information upon the subject of agriculture, were very full and minute in the enquiries which they embodied, and the replies to them, many of them equally minute, contain a large amount of valuable and interesting information, which will be found embodied in the agricultural report and appendix. This office is under great obligation to the intelligent gentlemen who have so promptly and fully responded to its enquiries. And particularly is it indebted to J. D. B. De Bow, esq., of New Orleans; Charles Cist, esq., of Cincinnati; B. P. Johnson, esq., of Albany, N. Y.; B. Bateham, esq., of Columbus, Ohio; J. Delafield, esq., of Seneca county, N. Y.; Minehall Painter, esq., of Pennsylvania, and N. J. Wyeth, esq., of

Cambridge, Massachusetts, for interesting and valuable communications.

Heretofore collections of such seeds for the field and garden as were deemed most valuable have been obtained for distribution from this office. During the last year near 70,000 packages were distributed. This year nearly as many have been obtained, and will be distributed to the members of Congress before the adjournment of the present session. Most of them have been obtained from seeds presented to this office by Mr. Vattemare, the enlightened founder of the system of national interchange, and by F. Hagedorn, esq., the Bavarian consul at Philadelphia, which were presented by their respective governments, through their agency, to this office. The seeds thus obtained were placed in the hands of an intelligent gardener for cultivation, and those which succeded best in our soil and climate, and appear to be of superior varieties have been preserved for distribution. Native seeds have also been obtained, and will be distributed.

This office is also indebted to Lieutenant Lynch, the commander of the expedition to the Dead sea, for many interesting varieties of seeds which have been kindly placed at the disposal of this office by the Secretary of the Navy, which will form a part of the seeds distributed during the present year.

Much complaint has been made by inventors, on account of the appropriation of a small portion of the patent fund each year for the agricultural report. And I have heretofore sympathised in such complaints. Mature reflection, however, has convinced me that no injustice is done to the interests of inventors by such an application of the patent fund; but on the contrary, the interests of the Patent Office and of inventors themselves have been subserved by it. The agricultural report of the office, by its wide dissemination throughout the country, has contributed much to increase the reputation and influence of the Patent Office, and to spread more widely among the people a knowlede of the new inventions and improvements which have been made during the year. And thus it promotes the interests of inventors, by contributing to the more rapid introduction and sale of their machines and improvements. Therefore, in the opinion of the undersigned, there is hardly any object to which the small appropriation made for the agricultural report could be applied, which would benefit inventors more than the preparation and publication of that document.

In the pursuit of its statistical investigations, this office has keenly felt the want of means for obtaining accurate and reliable information concerning the great industrial interests of the country. No provision has been made by the general government for obtaining such information, except in relation to the foreign commerce of the country. And, but very few of the States have adopted measures for obtaining authentic information in relation to their industrial interests. Massachusetts and Louisiana are in advance of most other States in their legislation upon these subjects. In the former State, very full returns are obtained in short periods of a few years, if not annually, of her industry and resources; and in

the latter, a bureau of statistics has been established, at the head of which has been placed one of her most intelligent and talented citizens.

A most interesting view of the vast resources of this great republic would be annually exhibited, if all the States should follow the example of Louisiana and Massachusetts. The statesman and legislator, to whom the people commit the destinies of their common country, would then have at their hands ample material to aid them in the intelligent discharge of their momentous and responsible duties, without which, they are like blind men feeling their way in the dark.

The next census, if the plan for taking it shall be well systemized and digested, will supply much valuable statistical information in relation to the population, industrial interests, wealth and resources of the republic.

The patent system of the United States having existed in some form or other for nearly sixty years, and having now become a very important and interesting institution, I came to the conclusion that a very brief statistical notice of the legislation affecting it, its financial operations, and the progress of invention as exhibited by its records, was much needed, and would be appropriate as a part of the annual report of this office. I have accordingly prepared such a statement, which is annexed, marked H. The table exhibiting the history and progress of the inventive genius of the United States contains, in a brief space, many valuable, interesting and striking facts, which cannot fail to arrest the attention of the intelligent observer.

The increasing business of the Patent Office has added so much to the duties imposed upon the Chief Justice of the District, who was by the act of March 3, 1837, constituted a court of appeals from the decisions of the Commissioner of Patents, that the present compensation which he receives for that service is wholly inadequate to the labor which he is required to perform. He now receives $100 per annum as the judge of appeals from the Patent Office. Within the knowledge of the undersigned there has been a single case before the chief justice involving an amount of labor and time, which, if devoted to any other pursuit requiring the same talents and attainments for its execution, would have commanded treble the sum he receives for his services in that capacity for the whole year. It would be just, therefore, that the present compensation of the chief justice should be increased to an amount which would be adequate to the duties and labors which the law imposes upon him.

The liberal provisions made by Congress each year for the library of the Patent Office have secured extensive and valuable additions to its size and usefulness. When I first assumed the duties of Commissioner, it contained from 2,500 to 3,000 volumes. It now contains from 5,000 to 6,000 volumes, which are mainly scientific in their character. A small portion of them relate to agriculture, statistics and political economy, and are very necessary to facili-

tate the investigations with which the office is charged concerning the great industrial interests of the country.

The vast number of books and periodical publications of a scientific character now in existence renders it extremely desirable that a general index, containing sufficient reference to the various volumes to enable the scientific investigator to understand the nature of their contents, should be prepared for the use of the public. Such a compilation is desirable in reference to all works of science, and it would be particularly useful and labor-saving to the Patent Office. I have, therefore, deemed it proper to recommend that a small sum be appropriated each year from the Patent Fund for the preparation and continuation of such a digest of the books and publications now in the library of the office, and of such as may be hereafter added to it. The work should, of course, be confided to competent hands, and, when completed, it should be printed for more convenient use. If it would be deemed proper to put the work on sale for the benefit of the Patent Office, it would unquestionably enable the office to realise much more from its disposal in that way than its compilation and publication would cost.

As Professor Henry, the distinguished secretary of the Smithsonian Institution, contemplates such a compilation for the library of that institution, the two works might be blended, and a most valuable index to the vast treasures of science would thus be given to the world.

The business, operations, and finances of the Patent Office, have expanded rapidly within the last four years. This fact will become more strikingly visible by a contrast of the progress of the office for the last four years with its progress for the four years next preceeding. The following statement will exhibit this contrast, viz:

First period of four years.

Year.	No. of applications.	No. of caveats.	No. of patents issued.	Amount received for duties and fees.	Balance carried to patent fund after deducting expenses, (exclusive of money paid for restoring models, &c.)
1841......	847	312	495	$40,413 01	$8,253 84
1842......	761	291	545	36,505 63	5,292 20
1843......	819	315	531	35,315 81	4,588 85
1844......	1,045	380	502	42,509 26	6,164 79
Total..	3,472	1,298	2,073	154,743 71	24,299 68

Second period of four years.

Year.	No. of applications.	No. of caveats.	No. of patents issued.	Amount received for duties and fees.	Balance carried to the patent fund after paying all expenses of the office.
1845......	1,246	380	511	$51,076 12	$11,680 49
1846......	1,272	448	619	50,264 16	4,105 45
1847......	1,531	533	572	63,111 19	21,232 84
1848......	1,628	607	660	67,576 69	8,670 85
Total..	5,677	1,968	2,362	232,028 16	45,689 63
	3,472	1,298	2,073	154,743 71	24,299 68
Excess.	2,205	670	289	77,284 45	21,389 95

It will be thus seen that the number of applications for patents, received during the last four years, exceeds the number received during the next preceding four years by 2,205; the number of caveats, by 670; the number of patents granted, by 289, the amount of receipts from all sources, by $77,284 45; the balance paid into the treasury to the credit of the patent fund, by $21,389 95.

It should be remarked, in reference to these results, that, during the first period of four years, more than half the applications for patents were granted; whereas, during the last four years, as has been before remarked, not much, if any, more than three-fifths of them have been granted.

It is also necessary to observe that, during the first four years, there was expended for the restoration of models, &c., the sum of $41,977 31. If this disbursement had been charged to the account of the expenditures of the office, there would, instead of being an excess of receipts over expenditures of $24,299 68, have been a deficiency of $17,677 63. The patent fund, therefore, instead of being actually increased, was diminished in the amount last mentioned, during the first period of four years.

During the second period of four years the sum of $5,257 54 was paid out for the restoration of models, &c. This sum has been reckoned in the account of expenditures for that period, and only the actual balance stated, which was carried to the credit of the patent fund. Consequently the patent fund has been increased, during that period, in the sum of $45,689 63. On the first day of January, 1845, the patent fund amounted to the sum of $170,779 20. On the first day of January, 1849, it amounted to the sum of $216,468 83.

This contrast of the business, operations, and finances of the office during the two periods above stated, is not made with a view to institute an invidious comparison between the administration of my immediate predecessor and myself—on the contrary, the affairs of the office were administered with great ability, prudence, and economy, by the late commissioner—but it is made with a view to

show the progress of the institution during the last four years; which is also interesting as an indication of the progress of the country in population and wealth, and the cultivation and improvement of science and the useful arts.

The exhibit which I have made in this and previous portions of my report of the affairs and business of the Patent Office, shows that it will soon be necessary not only to enlarge the Patent Office building, but to increase its clerical force. And, as it required three years of persevering effort on my part, sustained by the auxiliary aid of loud complaints on the part of applicants for patents, growing out of the delay occasioned by the great accumulation of business which could not be done, to obtain the late addition which has been made to the clerical force of the office, I have deemed it my duty now to apprise Congress that but a very few years will elapse before another addition to the force will be necessary. As the office sustains itself from its own revenues, it seems reasonable that it should be allowed a force sufficient for the prompt and efficient execution of its duties.

The law requires the Commissioner of Patents to report to Congress the operations of the Patent Office from January to January, and not from July to July, as in other branches of the government; consequently, the reports of the office cannot be commenced until after the calender year expires. The commissioner, therefore, is allowed comparatively but a very brief period for the preparation of his report, particularly in short sessions of Congress. Thus hastily prepared, it must necessarily be imperfect. And, in the desire of the undersigned to make his report at as early a day as possible, during the present session he has been necessarily compelled to defer the preparation of several tables required to illustrate the subjects treated of in the report, until they will be needed by the printer. This explanation was deemed necessary to account for their absence.

All which is respectfully submitted.

EDMUND BURKE,
Commissioner of Patents.

To the Hon. Robert C. Winthrop,
Speaker of the House of Representatives.

A.

Statement of receipts for patents, caveats, disclaimers, additional improvements, recording assignments, &c., and for certified copies, in 1848, *vix:*

Amount received for patents, caveats, reissues, disclaimers, and additional improvements	$64,132 50	
Amount received for recording assignments, and for copies	3,444 19	
		$67,576 69
Deduct for money refunded on withdrawal, and for money paid in by mistake		12,030 23
		55,546 46

B.

Statement of expenditures and payments made from the patent fund by the Commissioner of Patents, from January 1, 1848, *to December* 31, 1848, *inclusive, under the act of March* 3, 1837, *and subsequent acts of Congress making provision for the expenses of the Patent Office, viz:*

For salaries	$22,584 90	
For temporary clerks	7,956 80	
For contingent expenses	9,467 65	
For compensation to district judge	100 00	
For the library	1,414 09	
For agricultural statistics	2,608 17	
For printing digest of patents	1,700 00	
For compensation for services to E. G. Smith, as provided by act of Congress, approved August 5, 1848	1,000 00	
		$46,831 61
		8,714 85

C.

Statement of expenditures on the restoration of the Patent Office under the act of March 3, 1837, viz:

For restoring the records and drawings..............	$44 00

RECAPITULATION.

Amount of receipts from all sources..................		$67,576 69
Amount paid on withdrawals, &c., as per statement A...........................	$12,030 23	
Amount paid for salaries, as per statement B..................................	46,831 61	
Amount paid for restoration of records, &c., as per statement C................	44 00	
		58,905 84
Leaving a net balance, to the credit of the patent fund, of..		8,670 85
Balance in the treasury, to the credit of the patent fund, January 1, 1848.............................		207,797 98
Balance in the treasury, to the credit of the patent fund, January 1, 1849.............................		216,468 83

D.

Report of Charles G. Page, Examiner of Patents.

PATENT OFFICE, *January* 18, 1849.

SIR: In conformity with your requisition, I have the honor herewith to submit the following notice of inventions referred to me during the past year for examination:

At the commencement of 1848, the following classes were assigned to me for examination:

Class 1st. Agriculture, including instruments and operations.

2d. Chemical processes, manufactures, and compounds, including *medicine, dying, color making, distilling, soap and candle making, mortar, cements, &c.

*3d. Calorific, comprising lamps, fire-places, stoves, grates, furnaces for heating buildings, cooking apparatus, preparation of fuel.

*4th. Mathematical, philosophical, and optical instruments, including clocks, chronometers.

*5th. Lever, screw, and other mechanical power, as applied to pressing, weighing, raising, and moving weights.

*6th. Stone and clay manufactures, including machines for pottery, glass-making, brick-making, dressing and preparing stone, cements, and other building materials.

7th. Leather, including tanning and dressing, manufacture of boots, shoes, saddlery, harness.

8th. Household furniture, machines and implements for domestic purposes, including washing machines, bread and cracker machines, feather dressing.

*9th. Arts, polite, fine, and ornamental, including music, painting, sculpture, engraving, books, printing, binding, jewelry.

*10th. Surgical and medical instruments, including trusses, dental instruments, bathing apparatus.

11th. Wearing apparel, articles for the toilet, &c., including instruments for manufacturing.

*12. Designs.

On the 22d of August a division of the above classes was made, and those marked with an asterisk were retained under my charge, while the rest were assigned to Dr. Gale, one of the newly appointed examiners.

In consequence of this division the labor of my desk has diminished one half, and a brief reference to the progress of business will show that it cannot be long before the arrears will be entirely mastered.

On the 1st of January, 1848, there were 423 cases at my desk waiting for examination; on the 1st of August following, 463. On the 22d August the division of classes was made as above referred to, which left about 230 cases with me.

The number of new cases received monthly by me, since that time, has been about the usual average, while the number of cases in arrears has been rapidly diminishing, so that at this time I have on hand but 35 applications awaiting their turn for examination. The whole number of applications received in 1848 is 1,628, of which 767 fell to my lot, out of which number 397 have been transferred to Dr. Gale.

PHILOSOPHICAL INSTRUMENTS, &c.

Galvanism.—A patent has been granted for purifying water and other liquids by the action of the galvanic current. Under this patent also, it is contemplated to apply the galvanic power in the same way to the purification of beer. It is not customary to mention the names of patentees with their inventions, but as this invention is from abroad, it will be regarded with far more interest when it is known that the inventor and patentee is the well known Mr. Crosse of Bloomfield, England, justly celebrated for his stupendous experiments in electricity, the production of crystals of quartz, &c., by galvanism, and the development of insects (acarus Crossii) under the influence of electricity.

The purification of water containing, for instance, saline matters in solution, is effected in this case by the electrolytic or solvent action of the current; the salts being decomposed and their ingredients deposited respectively about the appropriate poles of the battery.

Magneto electric machines applied to medical uses.—A patent has been granted for an improvement in this class, in which a coiled spring was concealed within the pole of the magnet as a substitute for the ordinary flat spring used to close the galvanic circuit. The improvement was alleged to consist in placing the spring out of harm's way, as the ordinary flat spring was very liable to be deranged or broken.

Copying surfaces by electro chemical operation for telegraphic purposes.—A patent has been granted for a very ingenious invention, by which a sufficiently exact transcript of any surface regular or irregular can be sent from place to place through the electric telegraph. Prior to this invention, which was first patented by the inventor in England four or five years since, the Roman letter had been printed through the electric telegraph, and intelligence had also been conveyed by printing symbols so arranged as to represent letters, and both these operations had been performed through a single circuit of conductors; but to send intelligence by telegraph of the shape or configuration of any object seems to have required the exercise of great ingenuity.

Several years since a plan was exhibited in this office for accomplishing the same end by means of Morse's telegraph, and although it seemed plausible yet it does not appear to have been pursued, and it is not known whether it has proved successful. It is believed, however, that the inventor of the improvement before us was the first to have produced this curious result. By this invention a figure such as a type, engraving, print or manuscript in re-

lief is put upon a tablet, the motions of which are governed by clock work; in fact the tablet is made the descending weight or propelling power of the clock movement. The surface of the figure to be copied is covered or touched rather by an immense number of very fine metallic points closely packed, and a conducting wire connected with the pendulum of a clock is brought successively into contact with these points, and as the contact with each point completes the galvanic circuit an impression is made at the other extremity of the line upon a piece of chemically prepared paper, which is placed in a tablet moved by clock work, simultaneously and in a similar manner with the surface to be copied. Thus as the surface to be copied and the paper upon which the copy is to be traced move simultaneously, it is obvious that isochronal pendulums sweeping over both surfaces would cause marks made upon the paper at one end of the line to correspond exactly with the points of contact at the other end.

Telegraphic manipulator.—A patent has been granted for a mode of transmitting messages by Morse's telegraph, in which the communication to be forwarded is set up in type, the face of the types corresponding in figure to the dots, lines, etc., of Morse's alphabet. These types are set up in a frame, and a conducting point made to traverse the lines of type back and forth by the aid of simple machinery, and as the types are all in contact with one pole of the battery, the traverser, as it is called, being in connexion with the other pole, makes and breaks the circuit as it passes over the entire or interrupted surfaces of the types. The novelty consists only in the mode of arranging the types in the form, and in the construction and operation of the traverser.

Electro magnetic telegraph.—A patent has been granted for a telegraph of this class, in which the signals were made by dropping small balls upon an endless belt. At each electro magnetic motion communicated by the operation, the balls are released from a feeder and dropped upon an endless revolving belt on each side of a dividing line, and the signals are read off according to the distribution of the balls on either side of the line. The recording is effected by the pressure of the balls upon suitable paper, the balls being carried under this paper by the endless belt.

Signal or indicating telegraph.—A patent has been taken for a telegraph in which, although the electro magnetic force is employed, it is made to revolve a wheel in such a manner as to shew letters upon its face in certain positions. The novelty consists in the mode of making the escapement, and in a certain arrangement of symbols.

Electro magnetic recording telegraph.—This telegraph, patented during the year, claims to be an improvement upon Morse's invention, and differs principally from the original form in which Morse's telegraph was introduced in moving the paper towards the pen, instead of the pen towards the paper. When Morse's telegraph was first exhibited, the marks or symbols were made upon a travelling strip of paper by means of a pen constantly supplied with ink, and connected with a lever attached to the armature of

an electro magnet. Much difficulty was experienced in keeping the pen regularly supplied with ink and obtaining regular marks. The sudden jerk given to the pen was the source of one difficulty and a defect in the mode of supplying the ink the other. The present invention obviates one difficulty, by keeping the pen stationary and moving the paper towards the pen, and the other by an ingenious mode of supplying ink to the pen. A carrier which takes a given amount of ink from a reservoir charges the pen at regular intervals by means of the clock machinery.

A patent has been granted for a new and convenient form of electric machine for experiments, where a small amount only of electricity is wanted. It consists of a glass tube about two feet in length and two inches in diameter, which is moved back and forth through an elastic ring serving for the rubber, which is firmly fixed to a stand to be clamped upon a table. An insulating rod is fixed into a socket attacked to the upper portion of the elastic ring, and upon this insulating rod of glass is fixed a wire branching on either side, and terminating in rings which embrace the tube lightly. The wire answers the purpose of the prime conductor, and its rings embracing the tube serve as guides, and to collect the electricity on each side of the rubber as the tube is moved back and forth. The model furnished worked very well.

TAKING YEAS AND NAYS.

A patent has been granted for a mode of taking yeas and nays. The great delay attending this operation in legislative bodies has called forth a great deal of ingenuity to devise means for its facilitation and the saving of time.

A great many plans have been from time to time submitted for the approbation of Congress, though but one has been patented. The invention referred to, consists principally in operating levers furnished with lancet shaped points, so as to cause them to puncture paper, which is so arranged, as to shew the puncture or mark of each member in its appropriate place. Of course, there are as many sets of levers and lancets, as there are members, and each of these has a wire communicating with the desk of each member; two wires and lancets being required for each one, for the yeas and nays. The permanent record of the vote by the puncture in the paper has an advantage over the evanescent signals used in other inventions of this class. As a general rule, well made machinery is more accurate in recording or calculating than the mind of man, but it is obvious that a mechanical mode of taking yeas and nays must be infallible, before it could take the place of the present inconvenient method.

AGRICULTURE.

Potato Planter.—A patent has been granted for a machine for planting potatoes. It does not differ essentially from seed planters in general construction, but the mode of seizing and dropping the

potato is peculiar. The potatoes or pieces are let down gradually upon a grating, and revolving fingers, passing upwards through the stationary fingers or grating, take up the potatoes and carrying them over, deposit them in a suitable conductor to lead them into the furrows.

Atmospheric churn.—The discovery made several years since of making butter by means of a current of air forced through cream, has stimulated many inventors to contrive means of introducing air in conjunction with the ordinary process of agitation, under the supposition that the presence of air is necessary to the formation of butter from cream. But chemistry teaches us that no oxidating process is essential to the formation of butter from cream; and, indeed, a very common fact settles this point, viz: that by agitation, butter may be made from cream when it is secured in tight bottles; and this operation is, in fact, frequently performed to the detriment of the dairyman, while carrying his cream to market. The function really performed by the air, is merely that of agitation, and this it does very thoroughly under certain circumstances. The churn referred to was constructed in such a manner as to produce a most perfect agitation, by means of revolving arms connected with a vertical shaft; and, as the arms and shaft were hollow, it is evident that while in rapid revolution, by centrifugal action, the air would issue rapidly from the extremities of the hollow arms, and, rising in copiously disseminated bubbles through the cream, would add greatly to the agitation produced by the revolution of the arms themselves.

PRESSES.

Pressing fleeces of wool.—A novel instrument for this purpose has been patented, by which the fleeces are folded and compressed by a series of fingers, somewhat after the manner in which a like material of smaller dimensions would be compressed within the human hand. The fleeces thus compressed occupy but little room, and are more convenient for transportation than when packed in the ordinary manner.

Pressing cotton.—A patent has been granted for pressing cotton in a singular manner. Instead of pressing the cotton in bales as usual, the patentee proposes to form the cotton into an endless belt or batting, and by means of carrying rollers to receive it upon and wrap it tightly around a shaft or cone, which, after the roll is sufficiently large is withdrawn, leaving the cotton in a bale or mass of a cylindrical form. Evidently the form is most convenient for handling; but the availability in practice of this invention will depend upon more important considerations than this. In an article so bulky as cotton, stowage is of great importance; and it would seem as if the pressure attainable in this way would be too small to justify the undertaking. Experiment, however, is the umpire, and the inventor is confident of success.

SURGERY.

Setting artificial teeth.—Attempts have been hitherto made to cause the plates, holding the sets of teeth, to adhere to the mouth by atmospheric pressure, and several patents have been formerly granted for inventions of this class. All these plans have had their imperfections; and, although in some the plates once fixed would adhere well, yet it was not easy to remove them when occasion required, which with most persons is once at least in 24 hours. A mode, however, has been patented during the past year which seems to accomplish all that is desirable in this particular. By means of a cavity properly shaped and located in the plate, the tongue is applied to produce the exhaustion and fastens the plate immediately with great firmness, and, by a movement of the tip of the tongue, very easily acquired, the plate is readily detached.

Inhalation of ether.—A patent has been granted for an instrument for inhaling ether, and other like materials, which is very simple, cheap, and ingenious. In administering ether, it is necessary to admit atmospheric air with the vapor of ether, and various contrivances have been introduced in the inhaling apparatus for securing a due admixture of air. In the instrument recently patented, the vapor is administered simultaneously through the mouth and nose. The shape and size of the tube is such that it covers readily both these organs, and contains a sponge saturated with ether, and apertures for the admission of atmospheric air, all in a compact and convenient form.

The inhalation of ether was at first regarded with great caution by a portion of the medical world, and met with strong opposition from others. It is, however, working its way to the most extended use, and is now looked upon by the most enlightened as one of the most valuable and remarkable discoveries of the age. At the time a patent was granted for this new application of ether, it was contemplated for use only in conjunction with surgical operations. But since its effects upon the system have been carefully studied, it has been introduced into medical practice for a variety of affections, and with great success. In obstetrical practice where its application was least looked for, it has proved of eminent service, and out of some 580 cases of accouchement reported recently by Professor Channing, of Boston, not one experienced any injury from the use of ether. Since the introduction of this great and beneficent discovery investigations have been made as to the *anæsthetic* property of other substances, and several others have been substituted for the sulphuric ether first used, and it has also been found that the effect upon the system to which the term anæsthesia has been given, may be produced by other substances than the ethers.

SHOWER BATHS.

These valuable ministers to comfort and health are comparatively of modern origin, and it is not until within a few years that they

have received much attention with a view to improve them. Several patents have been granted during the past year for shower baths, and it would appear now as if their capabilities were well nigh all developed. One of the baths patented contains provision for a warm and cold douche, a warm and cold shower, and showering various parts of the body topically or diffusively, and in fact, giving every desirable variety of bath, and all by very simple means.

FINE ARTS, &c.

Tachygraphic Pictures. A term derived from Greek words signifying to paint quickly. Under the patent for this invention quite a new branch of the art of painting has been commenced, and although of limited scope, yet it is interesting and ingenious in its special applications. The general features of the art consists mainly in giving very high lights and deep shadows to such pictures as snow scenes, representations of conflagrations, water falls, and water scenery generally, and such like, by painting upon glass with Indian ink or colors, and using for the strong lights a translucent material, and placing behind the picture a sheet of bright metal, such as common tin, &c. Viewed in a strong light, the pictures thus produced have a fine effect.

Folding envelopes.—A patent has been granted for a machine for making envelopes, which is the first invention of the kind patented in this office. Since the great consumption of envelopes first commenced under the present postage law, machines have been patented for cutting the forms from sheets of paper, but the present machine stamps, pastes, folds, and embosses the envelopes in rapid succession.

Printing paper-hangings.—Apparently a very important step in the progress of this art is the subject of a recent patent. By this invention the paper to be printed is seized by the borders and carried through the printing apparatus by means of very ingenious adjustable clamps or fingers, and it will be readily seen how favorable such a mode of holding the paper must be when compared with the former method practised of drawing it through by the end, and perhaps receiving it upon rollers. The printing, of course, moistens the paper, and tends to make its surface uneven, while the winding up of the paper or carrying it along in a continuous sheet through the press by means of rollers, would mar the impression.

Mills and dies for printing.—A patent has been granted for an improvement in making the mills and dies in which figures are made upon a milled surface, the pressure being sufficient to obliterate all appearance of milling in the parts where it is not required, and to leave it where it is necessary. The inventor first makes on the die, and in incavo, the bondage, and a ground space without the ground figures. He then mills the entire curved surface of the mill by a separate milling tool or cylinder. He next presses or rolls the mill and die together, so as to produce on the former an impression of

the bondage and figure portions, and leave the entire ground of the mill in relief.

Daguerreotype.—A patent has been granted for a mode of improving the appearance of the ground of these pictures, by taking away the usual stiffness of a copied background. A screen is held in front of the sitter, which has an opening sufficiently large to expose so much of his person to view as is to be copied; and during the time of taking the impression the screen is to be kept in motion, which prevents any outline of the opening being copied, and also produces a dimness of outline in those parts of the figure covered by the screen. It gives an artistic effect, desirable for busts, and is well executed in the specimen sent to the office.

CALORIFIC.

Lamps.—An improvement in the lamp known as the spirit gas lamp, which is for burning the mixture of turpentine and alcohol, has been patented, consisting merely of using two wicks—one attached to the wick tube, and the other to the body of the lamp to draw up the liquid to feed the first named wick. A secondary or supplying wick has long since been patented for use in the camphine or pine oil lamps; but the principal design and mode of using the two wicks in this case is different. In the spirit gas lamp's the flame must be blown out before a lamp can be refilled with safety, or, in fact, before the wick tube can be removed for any purpose whatever. But in this lamp you may unscrew the wick tube, taking the small wick burning with it and set it a little aside while you fill the lamp by its light, the small wick retaining enough of the liquid to keep up the flame for some time.

Raising lamp wicks.—An ingenious device has been patented, in which the wicks are raised and lowered by pushing upon a projecting pin connected with the tube carrying the wick, which is enclosed, and slides up and down within another tube attached to the lamp cap. It saves the necessity of using or seeking for a pin or stick (never at hand at the time) for raising or lowering a wick.

Lantern and lamp.—Two patents have been granted for a lantern and lamp so combined that the instrument serves, by a slight movement, the purpose either of a lamp or lantern. In one of them the whole article does not differ in shape from a common hand lamp. The tunic or lantern corresponds to the bowl or fountain of a common lamp, while the lamp is contained within the leg or stand of the lamp, its wick tubes projecting just within the tunic or lantern. When the full light of a lamp is wanted, the lamp is raised up from its socket precisely in the manner in which a candle is usually raised from the candlestick, and the wick tubes of the lamp are projected through a small aperture in the top of the lantern tunic.

Glass fountains for Argand lamps.—A patent has been granted for a mode of constructing a mould for this purpose; and, if the glass fountain for this description of lamps can be made successfully, it will be a great improvement in this useful article.

Warming buildings by hot water.—A patent has been grant-

ed for an invention of this kind, which has been successfully tried upon a scale of some size. It consists in a plan of heating by radiation from surfaces heated by water, which circulates from a boiler and back to it, and in its circuit passes up and down two or more times through a series of heaters, each consisting of two tubes, one within the other, the water passing between the two, that the outer and inner surfaces of the heaters may furnish heat, and these are so combined as to receive the water from the boiler at one end of the series, while the other end gives it out to the boiler, and the series of heaters are so arranged that the water ascends in one, descends in the next, ascends in the next, and so on, the two extremes of the series being connected with the boiler. It is an old and well known plan of heating by hot water, to convey the water from the boiler through a series of pipes upwards, and then downwards through another series back to the boiler, there being an upward and downward movement in accordance with the well known principles of circulation. The question was raised whether the water would circulate through a series of tubes connected in this way, for as it would go on cooling in its passage through the tubes, it would not be supposed to rise after it had once descended in a cool state; but the applicant contended that the ascensional force of the hot column in the first tube would be sufficient to cause the forward movement of the water in all the tubes, and this he had tested by experiment. The plan, if successful, would be convenient in many cases where the series of tubes might be made within columns supporting a table, counter, wall, &c.

Warming buildings by heated air.—A patent has been granted for a plan of warming buildings by heated air, and also for a thorough ventilation, in which the principal feature is that of ventilating from above downwards. The only definite plan for heating and ventilating buildings upon this principle known to the office, was adopted in the Pentonville prison in England, a few years since, and so far as reported with great economy and advantage. The plan presented to the office, though involving this principal feature, differed essentially in the details, and seemed to present advantages over that adopted in the Pentonville prison. The plan of ventilating downwards is objected to by some, upon the ground, that it is not natural, that is, it must be forced, or perhaps some have attempted such an inference upon the too common supposition, that analogies drawn from nature's operations are those most likely to subserve man's wants. But such considerations are futile, in regard to the heating and ventilation of a dwelling house, an artificial structure, where heating and ventilation cannot proceed altogether upon natural principles. The inventor asserts with reason, that in ventilating upwards, the dust from the floor or carpet must necessarily rise and vitiate the atmosphere, while in ventilating from above downwards, a pure air is introduced into the room, and whatever effusion, dust or impurity may escape from the person or dress, must be carried out below, before it can mingle with the air to be breathed.

Ventilating ships.—A patent has been granted for applying two

ventilators or chimney caps, in such a manner, that one shall favor the introduction of the air into a vessel's hold, and the other its egress. They are called, respectively, injecting and ejecting ventilators.

Fire proof safe.—A fire proof safe has been patented, in which the partition usually containing gypsum, as the incombustible, non-conducting material, was filled with running water to be used in large cities, where a stream of water can be had.

Stone and clay.—Grooved bricks. A patent has been granted for moulding bricks with dove-tailed grooves upon their faces, for the purpose of locking them more effectually together by means of the mortar filling the grooves.

Artificial slate, and fire proof cement.—A patent has been granted for making a fire proof paint or cement of a peculiar earth, found in Sharon, Medina county, Ohio. It is composed of one-half silica, one-quarter alumina, smaller proportions of oxide of iron, sulphuret of iron, lime, and carbon. It is of a dark color, almost black, and is quite soft like tallow, when first taken from the earth. Upon exposure to the air, it hardens like a stone. The earth when dry, is ground up and mixed with linseed oil, it forms an excellent paint, fire proof and very hard, so that when a considerable thickness is spread upon paper or wood, it makes a good artificial slate.

CHEMISTRY.

Bromine.—An improvement in the manufacture of bromine has been patented, in which three novel points are presented. First, a new kind of retort composed of earthenware and coke. Second, using the bittern as a bath for distilling the bromine; and thirdly, the employment of a luting composed of pipe clay and bittern.

Chloroform and Gutta Percha.—A patent has been granted for a varnish made by dissolving gutta percha in chloroform. The solution is very readily made, and furnishes an excellent water proof varnish.

Prussiate potash.—A patent has been granted for employing in the manufacture of this article the caustic alkali instead of the crude material heretofore used.

Gutta Percha.—Several patents have been granted for modes of employing this substance; among the valuable applications of it are hose and tubing of all sizes, which are made by a process somewhat similar to the mode of making lead pipe. It is said also to be of great value for bands in driving machinery as a substitute for leather, rubber, and rubber cloth. It possesses a texture differing from caoutchouc and has but little elasticity. Before the bands are ready for use they are stretched forcibly, as in the case of the best leather bands. The stretching of gutta percha to a certain extent, is said to add to its strength, and although it will yield considerably at first, it does not relapse again, qualities admirably adapted to bands. The gutta percha has come into extensive use for shoes as a substitute for caoutchouc or other water proofing

material in the soles. It has been patented also as a substitute for patent leather. An immense variety also of articles are made from gutta percha, and from the facility with which it may be worked, and its various useful properties, it may be considered one of the most valuable acquisitions of modern art. It is, however, not so durable as india rubber, and from specimens shown to me that had been exposed to the weather for five or six months, it appears quite easy of decomposition, as the material was decomposed to the depth of the thirtieth of an inch.

In conclusion, allow me to add, that your examiner, from present appearances, indulges the hope that the coming year will witness a most flourishing and satisfactory condition of your office, and that ample time will hereafter be afforded to the examining corps to make their daily and yearly reports to you with more deliberation than has been heretofore practicable under the immense pressure and hurry of business.

CHAS. G. PAGE,
Examiner.

Hon. Edmund Burke,
Commissioner of Patents.

E.

Report of W. P. N. Fitzgerald, Examiner of Patents.

Sir: In compliance with your wishes and the practice of the office, I have the honor to submit to you the following report in relation to the applications for patents which have been referred to me for examination, and examined within the year 1848.

On the first of January, 1848, in consequence of the vast increase of business for several years immediately preceding, three hundred and fifty-three applications had accumulated upon my desk, which I had been utterly unable to examine. This great accumulation of business, together with the additions made to it by the rapid influx of new applications, has been a source of great embarrassment throughout the year, and has rendered it impossible to make that progress which might easily have been made under different circumstances. It is unnecessary to dwell upon the various particulars in which a great accumulation of applications produces embarrassment and delays; you are familiar with them, and they are set forth with sufficient fullness in my last report.

The numerous applications belonging to each class upon the desks of examiners at the same time, renders great circumspection necessary to avoid granting patents for the same devices which are found in other applications. This renders it necessary to examine large classes at the same time, to the prejudice of others; and hence it becomes impossible to give at the close of the year a correct view of the comparative progress of the various branches during the year. Nearly all belonging to some classes may have been examined, while the principal part of the applications belonging to others may have accumulated. The number of applications patented and rejected during the past year will therefore show rather the condition and progress of the office, than the comparative progress of the various branches of the arts and manufactures to which they belong.

At the commencement of the year the classes under my charge were as follows:

1st. Metallurgy and manufactures in metals.

2d. Manufactures of fibrous and textile fabrics and all machinery therefor.

3d. Steam and other engines.

4th. Navigation and marine implements, comprehending naval architecture, propellers, &c., &c.

5th. Civil engineering and architecture.

6th. Land conveyance, comprehending all kinds of vehicles and implements of travel and transportation by land.

7th. Mills, comprehending all kinds of machinery for crushing or grinding, horse powers, mechanical movements, &c.

8th. Machinery for working in lumber, comprehending saw mills,

planing machinery, stave machines, boring machines, mortising machines, &c., with the various tools and implements used therein.

9th. Fire arms and implements of war, comprehending ordnance, all kinds of weapons, &c., with the manufacture of the same.

10th. Hydraulics and pneumatics, comprehending hydraulic engines, presses, &c., water mills, wind mills, fire engines, filters, machinery for raising water, &c., &c.

11th. Miscellaneous, consisting of applications for patents which do not properly fall within any of the other classes.

These classes continued under my exclusive charge until about the first of July last, when Mr. Renwick, then recently appointed examiner, took charge of them jointly with me. From that time until recently we have labored together and have monthly reported the result of our joint actions upon applications to you. Our examinations have not been confined to the classes which each has now in charge, but portions of several classes have been examined by each. Our object at first was to bring up the arrears of business, and afterwards to make such a division as would be fair and permanent. During the time we were thus acting together it would be difficult for either to report fully upon the classes acted upon, and the precise number acted upon by each could not be ascertained without a detailed examination of the cases which would require more time than would be justified by the value of the information which would be obtained, as we consider it unimportant.

The whole number of applications referred to our desks during the year 1848 is 854. Of these 292 remained unexamined on the first of January, 1849. The number of applications examined and passed is 356, and the number of rejections is 546.

A division of classes is now made and our joint labors have ceased. The classes now under my exclusive charge are

1st. Fibrous and textile manufactures and machinery therefor.
2d. Land conveyance.
3d. Mills.
4th. Machinery and tools for working in lumber.
5th. Hydraulics and pneumatics.

Improvements in these classes, with their various subdivisions, and in the classes heretofore under my charge, which I have examined and which have been patented within the year 1848, I will proceed as concisely as possible to review; the accumulation of business on my desk does not allow a lengthened discussion of these subjects.

FIBROUS AND TEXTILE FABRICS AND MACHINERY THEREFOR.

The first operation, after the fibrous material is collected, is to clear it from the coarser substances with which it is usually connected. This is done by breaking, as in the case of hemp, flax, &c., whipping for cotton, &c. Hemp is afterwards subject to hackling, cotton to ginning, wool and cotton to burring or picking. After these processes the wool or cotton is subjected to the carding engine. Wool is sometimes combed upon appropriate ma-

chines. Other fibrous materials require somewhat different preparation.

After the fibres are properly cleaned and straightened they are sometimes, as in case of wool and fur, felted together. But more frequently wool, cotton, &c., are spun for use in the thread, or to be afterwards woven. After the yarn is spun, or the fabric woven or felted, various other processes, according to the nature of the material or fabric, are necessary before the fabric is fully prepared for use. To the class under consideration belong the various processes above alluded to, and the machines used therefor, which latter present great variety, delicacy and complication. Such improvements as have been patented in these processes or machinery I shall examine as far as possible in the order above indicated.

PREPARING HEMP AND FLAX.

Three or four patents have been granted within the year for improvements in machinery used for preparing hemp and flax.

The manufacture of linen in consequence of the length of the fibres of flax, &c., is much more difficult than that of cotton, and many efforts have been made to reduce the expense of preparing the fibres for spinning. The mode finally resorted to was to cut the fibres into short pieces so that they might be operated upon by cards like cotton. This course is very extensively pursued. For most purposes the linen is materially deteriorated by this mode of manufacture, while it retains the same general appearance, but for some purposes it answers equally well with that manufactured by the processes previously resorted to. Letters patent have been granted within this year, for improvements in machinery by which hemp and flax may be prepared in this way for the cards.

Letters patent have also been granted for machinery, for breaking and cleaning hemp and flax, made after the old plan of vibrating and stationary knives and scutchers. The principal improvements presented by this machine are, so arranging the cranks and moveable knives, that the force required to operate the machine in all positions of the parts shall be nearly the same; thus effecting a saving of power and steadiness of action, and in so shaping and arranging the scutchers, that they will take the broken flax by degrees, and without effort on the part of the attendant, and thus more easily and effectually separate the fibres from the broken and woody fragments which hang to it.

Less has been done during the past year in this branch of machinery, than heretofore.

PREPARING COTTON AND WOOL.

A part of the machinery for preparing cotton and wool for the cards, is in some instances the same, and may therefore be considered together, though the gin is generally used for cotton only.

About six patents have been granted within the year for improvements in preparing wool and cotton, and separating them from the coarser part of their impurities.

One patent has been granted for improvements in the "roller gin," intended principally for long staples. The machine differs but little from those heretofore used, but the operation of ginning is a nice one, and small changes often produce important results. In the machine under consideration, the "shell" is used for keeping back the impurities, which to some extent interrupts the feed, and a feeder is applied to this machine, which in connexion with the other parts seems to obviate this inconvenience, and to cause the machine to operate more evenly, and gin better.

Another gin has been patented, which operates by drawing the cotton in between a roller and a travelling endless belt, held up to the surface of the roller by a curved block capable of yielding, and being sharp at the edge where the cotton enters. Before entering between the belt and roller, it passes between the same roller and the edge of a plate, above which a beater revolves to beat off the coarser impurities. The cotton after passing to the opposite side of the roller is brushed off in the usual way.

Letters patent have also been granted for a beater for burring wool, cotton, &c., consisting of a cylinder composed of discs united by lags at some distance apart. Some of the lags are armed with numerous teeth, attached like card teeth to leather, and much resembling card teeth in form, and others are armed with plain beaters. The teeth are bent, but so placed upon the leather and lag as that the outer part of each is radial. The teeth take off the principal part of the impurities from the wool or cotton on the burring cylinder, and the beaters beat off or loosen those which adhere so closely as to cause the teeth to yield.

A patent has also been granted for a wool and cotton picker, whose feed rollers are divided into short sections and held together by a rod or axis passing lengthwise through openings in them larger than the axis. Each section of the roller thus formed and held together is pressed to its place by a separate spring, so that a burr or knot drawn between the feed rollers will elevate only the section it passes under and leave the rest of the roller to feed as usual. The foregoing is united with some improvements in the burring cylinder.

Another machine for picking wool and cotton has been patented, whose peculiarities consist in a new arrangement and construction of toothed rollers, which could not be described within reasonable limits or understood without drawings. In this machine the gauze roller near the lapper is armed with teeth.

Much ingenuity has been exerted within the last few years in devising means for the economical manufacture of cylinders used for burring and, also, for carding wool; and also in the manufacture of beaters for burring machines.

Letters patent have been granted for the mode of constructing the hollow cylinder, to which the teeth of burring or carding cylinders are to be attached. A light cylinder of tinned sheet metal is first made—wire, covered with tin, is then wound tight and spirally all over the convex surface of the cylinder. Metal proper for soldering is then poured over the surface thus formed,

which renders the whole firm and compact; the surface is then turned true, and the cylinder is ready to receive the teeth of such character as may be desired.

Letters patent have also been granted for a new method of constructing burring cylinders. A proper cylinder is first constructed for the reception of the teeth; wire of proper size is then rolled flat and afterwards planed in such manner as to leave a rib or shoulder its whole length on one side, and a thin edge on the other. Notches are then filed into the thin edge at intervals, thus forming teeth. The convex surface of the cylinder is then grooved at proper intervals around its surface, and the toothed strips on the edge having the shoulder are laid into the groove, and the ridges of metal between the grooves are forced down upon the shoulders to hold them in place; or the toothed strips are wound upon the cylinder and soldered, and the cylinder is finished—the shoulders, &c., giving proper distance between the rows of teeth.

An improvement in beaters for burring machines has also been patented. It does not differ essentially from beaters heretofore used, except in this—that the spaces between the vanes can be reduced as the vanes wear, and a good edge be presented until the vanes and the whole convex exterior of the cylinder is exhausted, instead of becoming worthless when the vanes are worn.

CARDING MACHINES.

But few patents have been granted during the year for improvements in this variety of machinery.

A patent has been granted for a carding machine, in which a cylinder like Parkhurst burring cylinder is made to work against the main cylinder. When cards are used the teeth will yield, and a knot closely matted together might be carried through the machine without being properly opened; but the cylinder above mentioned would hold such a knot and bring it successively in contact with the teeth of the main cylinder, until by degrees it would be opened and carried forward.

Another patent has been granted for improvements in this variety of machines, which consists principally in banding from the main cylinder, and thus giving a high speed to the workers with little increase of power.

ROVING, SPINNING, DOUBLING AND TWISTING, ETC.

Some eight patents have been granted within the last year for improvements in machinery for performing these operations. After the cotton or wool is carded it is taken from the doffer in slivers, and is drawn and twisted until it is formed into threads of the proper size by the processes above named. These operations are of the most delicate character, and modifications which would be of no moment in coarser machines are of the highest importance in these. The "*drawing*" above mentioned is performed in drawing frames by passing the roving between several sets of rollers, each pair revolving

faster than the preceding. The duty of these rollers is important, and much care and ingenuity have been exercised in improving them. It has been ascertained by practice that one of these rollers should have a flexible surface, and a great variety of materials have been used for the purpose. The rollers are apt to become smooth and slip on the material. Generally, a strip of soft leather is wound around the roller, but this wears out or stretches. Letters patent have been granted within the year for rollers, made by cutting a groove around the solid part of the roller, leaving shoulders on each side, and then drawing over these shoulders and into the groove a small hollow cylinder of vulcanized India rubber, which will at once contract to its place. The ends of the grooves at the shoulders are deepened, in order that the diameter of the roller at the ends of the India rubber may be less than at the intermediate points.

Letters patent have been granted for improvements in the stop-motion of the drawing frame. When the roving breaks it is of course necessary for the machine to stop until it is joined. Devices have heretofore been used, such that the thread or roving by its strength or friction sustained a lever or other device, which, when it broke, would fall, and by appropriate mechanism throw the machine out of gear. But the roving having very little adhesion, is often broken by the strain required to sustain the lever. The invention above mentioned was intended and is calculated to obviate the difficulty heretofore experienced. The roving simply rests its weight upon the lever through a convenient medium, and by breaking relieves the lever of the weight, and the lever is so nicely balanced as to rise under such circumstances and throw the machine out of gear. The roving having no strain but its own weight to sustain, is far less liable to break than in the machines above mentioned. The machine contains other features of novelty, but it is impossible to render them intelligible in this report.

Letters patent have also been granted for improvements in the drawing head. The drawing motion has heretofore been given to one of the rollers by the differential revolutions of the tubes. But this motion was communicated through gearing on one side of the apparatus. This was found not to be sufficiently steady and compact for high speeds; and the patentee appears to have avoided this imperfection, by substituting for the outer gearing a worm on the interior of a moveable part of the tube working into the grooves in the drawing roller.

Letters patent have also been granted for improvements in the spinning frame. The bobbins on each side of this frame are made to rise and fall alternately, for the proper distribution of the thread. The rising and falling part of the machine on opposite sides are so constructed as to balance each other, thus saving the power which would otherwise be necessary to operate them. The bobbins are all driven by bands passing around a common drum, extending lengthwise through the machine. As the bobbins rise and fall, their relative distances from the drum are changed, and the bands would naturally be tighter at one time than at another. To

obviate the inconveniences arising from this circumstance, the motions of the bobbins are so timed, that when one is at its greatest distance from the drum, the other shall be at its least—while slides, with angular slauts in them, embracing the gudgeons of the drum slide up and down, pressing the drum towards one side or the other, as the bobbins recede or approach; thus preserving nearly the same tension of the bands throughout the traverse.

In laying the yarn in cops by spinning machines, the threads are made to lie in such a direction that when romoved from the spindle, which for some purposes is necessary, unless very carefully handled, they will fall. Letters patent have been granted within the year for an improvement in the spinning frame, which in a great degree overcomes this inconvenience. It consists principally in giving such a form to the cam which operates the copping rail, that the rail shall, in its descent, move so rapidly as to allow but little winding from the point of the cop to the base, and in its ascent, shall move slowly and wind the thread closely from base to point. This combination of the threads sustains the cop in every direction, and renders it much less liable to fall than when formed in the ordinary way.

Lettters patent have been granted for an improvement in the "wheel" for hand spinning, which consists in so arranging the parts, that when it is desirable by pressing a treddle with the foot, the head of the wheel can be brought to the attendant, and carried back to its place, without in any way deranging the machine or stopping its operations.

The improvements in spinning machinery, patented within the last year are interesting, perhaps to an unusual degree, but I can dwell no longer upon them, but must hasten to that variety of machines which naturally follows spinning machinery.

WEAVING LOOMS.

Nine or ten patents have been granted within the year, for improvements in weaving looms. Two of these are for improvements in the jacquard, of which it would be impossible to give an idea without drawings, and a description more lengthy than would be appropriate in this place. The object of one of the inventors is to simplify the apparatus, and diminish the number of trap-boards, cylinders, and needles without impairing its efficiency. A new mode of throwing the shuttle has also been patented, which would not be easily understood without drawings; and is perhaps rather ingenious than practically useful. A mode also of operating the harness has been patented, whose details could not here be rendered intelligible; but its object is to operate by the same hook several leaves in succession. Other improvements must be passed unnoticed, in consequence of a degree of complication which would render an attempt at description useless in this report. It is unfortunate that such is the nature of so large a proportion of this interesting branch of machinery.

Letters patent have been granted for a combination of parts for stopping the loom when the thread breaks or when the shuttle does not go home. The fork and grid varied in position from what is usually employed for action when the thread breaks, and combined with devices for operating the shipper when the shuttle fails.

Letters patent have been granted for an improvement in shuttles for regulating the drawing of yarn from the bobbin by a small spring lever. Spring levers in various forms have heretofore been used for the same purpose, but the shocks to which the shuttle is subjected are so violent and rapid that they soon get out of order. The lever has been pressed upon the thread by spiral springs wound round a rod, and held by a set screw, but the screw having so slight a hold of the rod is jarred loose and the lever ceases to operate. To obviate these difficulties the patentee places one end of his lever, of convenient form, in a groove in the solid end of the shuttle and parallel with its length. The other end rests upon the thread in the hollow of the shuttle. Directly under the end first mentioned of the lever, a hole is bored entirely through the solid end. In this perforation a spiral spring is dropped, one end of which rests against the lever, and the other is sustained and the spring adjusted by a screw working in the perforation, and whose head is sunk within the surface of the shuttle. The position of the spring, the lever and set screw are such that the endwise shocks to which the shuttle is subjected have little tendency to disturb them, and the action of the lever upon the thread will at all times be substantially the same.

Letters patent have also been granted for an improvement in weaver's temples and for an improvement in pickers. The picker patented is constructed as follows: the raw hide is bent in the usual way; between those parts which ordinarily strike the shuttle, there is laid a piece of metallic India rubber; an opening is made in the raw hide, such as to allow the point of the shuttle to enter the picker, until it reaches the India rubber; the shuttle thus receives the India rubber upon its point when struck instead of the raw hide, and the small fragments of the raw hide which the point of the shuttle separates from the ordinary picker, and which are often thrown into the fabric while being woven, are avoided.

It is unnecessary that I should dwell longer upon this class.

KNITTING MACHINES.

Three patents have been granted within the year for improvements in knitting machines. One of them was for a machine invented in Europe, and described some time since in the English journals. It is, therefore, unnecessary to attempt a description of it. The machine is rather complicated, and not calculated to operate so well or accomplish so much as several other machines heretofore in use.

The other two are for improvements in the needles. In knitting machines generally, the needles which receive the yarn for the formation of the loops, are hooked at the points. The loops are hung upon these hook-points, and as the new loops are placed upon the

needles, the old ones are carried back beyond the points of the hooks. A presser then comes down upon the hooks, and presses the points close down to the body of the needle leaving the new loops within the hook. The old loops then slip over the hooks upon the necks of the new loops. Instead of the long point of the hook and the presser, one of the patentees uses an auxiliary needle and a short hook. When the old loop is drawn back upon the shank of the needle, the auxiliary needle retires to allow it to pass; and when the new loop is formed, and the old one is to be thrown off, the auxiliary needle is thrust through an opening in the loop needle to guide the old loop over the point. A somewhat similar contrivance is used for seaming.

The other patent above mentioned is for an improvement in the form and action of the needle. At a short distance from the point of the needle, a short lever is hinged and turns freely on its fulcrum. When the old loop slides back it carries the lever over with it. The new loop is then placed upon the hooked point of the needle, the old loop having been carried back beyond the end of the lever. The old loop is then pushed forward and carries the lever with it, which guides the loop over the point of the needle upon the neck of the new loop.

SEWING MACHINES.

But one patent has been granted within the year for improvements in this variety of machinery. The improvements are in the mode of putting tension upon the thread, and in the shuttle which carries the auxiliary thread. The machine operates upon the general principle of one patented a few years ago. Within the last year sewing machines have received a good deal of attention, but nothing further on the subject is in condition to be spread upon this report.

PAPER.

About eight patents have been granted within the year for improvements in machines used in manufacturing, cutting, and performing other operations on paper.

One of these patents is for improved machinery for grinding the pulp. The machine much resembles mills for grinding grain. It is so arranged that the pulp is kept in circulation through the mill, passing in at the eye and out at the edges, until the whole is properly prepared.

In one of the machines patented, the paper is cut into sheets of any desired length, placed upon a table, and the edges adjusted for folding. To insure corresponding action throughout, the motions of various parts of the machine are taken from the cylinder which carries the knife.

Others of these machines cut the paper and drop it upon rods, over which it bends and hangs preparatory to folding.

Letters patent have been granted for an improvement in sand

paper, which consists in sanding both sides and the edges. The sand on the outside enables workmen to hold it, without injuring by doubling, and the edges are very useful in polishing parts which cannot be reached by the flat part of the paper. The article is vastly more durable than that previously in the market.

Letters patent have been granted for an improved sieve for shaking the sand upon the paper. It is so braced from the point which receives the blow, that the shock is transmitted throughout with nearly equal intensity, and thus distributes the sand evenly.

In another machine patented, the parts are so arranged as to distribute the sand on both sides of the paper.

A few patents belonging to this class, have been granted for improvements of a miscellaneous character.

One of these is for an improved tenter frame, for stretching and drying textile fabrics. As the fabric leaves the roller upon which it is wound, it passes under small cog wheels which force its edges upon the tenter hooks. The tenter hooks are fixed upon two endless chains at each side of the frame. As the endless chain travels, the tenter hooks draw the cloth along with them. The ways, as they progress, become wider, and thus the fabric is stretched, and at the end of the frame it passes over a roller for drying, and is finally received and wound upon another roller.

Letters patent have also been granted for improvements in napping cloth with flox, for dressing fabrics previous to printing, and for grinding the teeth of cards.

I shall forego all further remarks upon the class of fibrous and textile fabrics and their machinery. They have been pretty thoroughly reviewed and at sufficient length.

STEAM ENGINES, LOCOMOTIVES, &c.

This is one of the classes transferred to my colleague, Mr. Renwick, who will report principally upon the patents granted for improvements therein. But few of those which I have examined require notice in this place.

An ingenious arrangement of balance valves has been patented, in which the pipes are not extended around to both of the outer sides of the valves, but the steam passes down through the tube which connects them into a small cavity surrounded by a kind of valve seat under one of the valves for equalizing pressure.

Patents have also been granted for an improvement in the arrangement of boilers, furnaces and flues, by which the heat remains longer in contact with the heating furnaces.

Letters patent have also been granted for an improved locomotive. It has ten driving wheels, and two sets of cylinders; one pair of these cylinders are connected with, and drive six of these wheels, and the other pair drive the other four. These operate together or separately as the grades or other circumstances require. When the maximum of traction is desired all the engines operate and the whole of the ten wheels operate as driving wheels; when the minimum of traction only is necessary the engines operating

the four driving wheels are worked, leaving the other six as supporting wheels. To produce a medium degree of traction, the engines which operate the six wheels are worked and the four become supporting wheels. It is obvious that the number of wheels in both sets can be varied, preserving similar relations to each other and producing similar practical results.

Nothing further in this class requires my attention; the rest of the ground will be covered by Mr. Renwick.

FIRE ARMS AND IMPLEMENTS OF WAR.

This class, in comparison with many others, presents but a narrow field for invention. The improvements, however, examined and patented within the year, are much beyond the common average. The circumstances in which the country has recently been placed, have probably caused this branch of the arts to receive an unusual degree of attention. Some eight or ten patents belonging to this class have been granted within the year, but most of the applications have been examined since the class was transferred to Mr. Renwick. One patent, however, for improvements in the manufacture of bullets, I will notice. The bullets are formed in dies, one fixed and the other moveable. The fixed die has a cylindrical cavity semi-spherical at the bottom, with a cleaver passing through the bottom which, when force is applied, becomes flush with the bottom. The end of the moveable die has a semi-spherical cavity in it coming to a sharp edge at the end, and is of proper diameter to fit the cylindrical part of the fixed die, and is placed opposite to it. The lead is fed into the machine by a motion properly regulated, in the form of a plate, at once wider and thinner than the diameter of the ball to be formed. The moveable die then comes forward separating a strip of lead from the plate, and as the strip has less diameter than the cavity in the fixed die, it is easily carried forward into it by the moveable die and pressed into the desired form. When the moveable die retires the clearer forces out the bullet. The balls thus formed are thought to be of equal density and are free from the sprue and other imperfections incident to balls made in moulds.

NAVIGATION AND MARINE IMPLEMENTS.

This class is also transferred to my colleague; I shall, therefore, limit myself to such improvements as I deem worthy of remark, which were patented while the class was under my exclusive charge.

ANCHORS.

But one patent has been granted during the year for improvements in anchors. This anchor is made in the usual way, except that a rod which passes through the top of the shank for insuring the proper position of the flukes when in use, is armed at its ends with flukes or points at right angles to it, and has such a degree

of rotation allowed to it as will permit these points to penetrate the bottom and hold when strain comes upon the anchor.

SHIP'S WINDLASS.

Three patents have been granted within the year for improvements in windlasses. One of these is called by the inventor a "cable lifter," and is best adapted to the lifting and transferring of cables from one place to another. The cable does not necessarily wind around its barrel, but the links are held and carried forward.

Another of these patents is for an improvement in guiding the cable to and from the windlass.

The third is for moving very heavy bodies, drawing up vessels, &c., and is for equalizing the strain upon the two cables, or the double cable, which the inventor proposes to use. A wheel is firmly attached to the middle of a shaft. This wheel has cogs on its periphery into which a screw works for giving motion to it and the shaft, and has also an opening near its periphery through which the cable passes. On each side of the wheel there is a loose sleeve upon the shaft, which may revolve independent of the wheel and shaft. The cable is passed through the place prepared for it in the wheel; each part is then carried over the sleeve and onwards, and attached at two different points to the object to be moved. The windlass is then set in motion and the cable wound upon the sleeves, and whenever the strain comes more severely on one end of the cable than the other, the sleeves slip on the shaft, and the cable slips in the wheel, until the strain is equalized. The advantages of this arrangement are obvious.

PROPELLING VESSELS.

Five patents have been granted during the year for improvements in propellers. One of them is for using a steam propeller in combination with side paddle wheels. The side paddles to be placed generally in front of the vessel's centre of gravity. Another is for an improved form of flexible paddles; and a third for combining with a propeller partially enclosed, a guard to prevent water from entering it, to be carried around in the case. These propellers do not require further notice in this report.

A new mode of facilitating the progress of vessels through the water has been patented within the year. The primary object of the invention is to interpose between the hull of the vessel and the water a stratum of air to diminish friction. The exterior surface of that part of the hull which is immersed in water, is made substantially in the form of scales pointing towards the stern. At the extremities of these scales air is ejected. As the vessel passes through the water at a high speed, there is a tendency to a vacuum, in consequence of the shoulder left at the extremity of each scale, and the ejection of the air will be facilitated thereby. The resistance which the vessel will meet with from friction against air,

is evidently less than friction against water; and an obvious advantage is thus gained. But the exterior of the vessel must be modified, and machinery and power will be required to keep the hull of the vessel immersed in air; and whether the same expense and power will produce a more advantageous practical result on this than on the old plan, must be determined by experiment. It is hoped that the invention will be fully tested.

LAND CONVEYANCE.

A very considerable number of inventions belonging to this class have been patented within the year, some of which promise to be useful.

Several patents have been granted for springs and other appliances, for hanging the bodies of carriages for common roads, which it is unnecessary in this place particularly to describe.

New modes of coupling railroad cars have also been patented. One of which consists principally of a hook, so formed as to rise when pressed by the connecting link to receive the link, and when the link has come to its place it forces the hook down, and whether drawing or pushing holds it in its place.

Patents have also been granted for dumping cars and wagons. In one of which the body of the vehicle travels to its place, and to the proper position for dumping on rollers sustained by ways, and when in position is raised by eccentrics and bars of wood placed under it upon which it rests, until again raised in the same manner for the removal of the bars for dumping.

In another, the body of the car runs back and forward upon ways and rollers, but when it reaches the proper position for resting upon the running gear, the rollers fall into grooves prepared for them, and the car body rests firmly upon the ways. For dumping, the car body is raised from its position by levers with rollers in their ends working against inclined planes on the bottom of the car body, by the combined action of which it is raised and receives its backward motion.

In a third, the body rests upon a curved rack, with an intermediate toothed wheel attached to the body working into it, and is moved in either direction by a crank or other equivalent device operating the wheel. The teeth of the rack and the wheel are always in gear.

Letters patent have also been granted for arrangements and combinations of wheels, &c., for railroad cars. The wheels of railroad cars have been connected with the body of the car by short axles, sustained by a stirrup-like frame on each side, each wheel having an independent motion; but the length of the axle was not sufficient to hold the wheel with sufficient firmness. To avoid unnecessary vibrations fast and loose wheels have also been used, but without the stirrups above mentioned; accomplishing but one object, that of turning curves.

Letters patent have been granted within the year for a combination of the fast and loose wheels, with the stirrups and an axle ex-

tending from one wheel to the other, giving the requisite firmness to the wheel by the long axle and stirrups, and the facility of turning curves by the fast and loose wheels.

Letters patent have also been granted for a construction and arrangement of wheels, in substance as follows: the front and rear wheels are in all respects as usual; but intermediate, between them, are placed one or more pairs of wheels without flanches and of a conical form, the smallest diameter of the wheel being inwards. When a car thus furnished with wheels is travelling around a curve, the middle wheels, on the outside of the track, will rest upon their largest diameter, and will in some degree raise the other wheels from the rail, and will cause that side of the car to travel faster than the other, to compensate for the difference between the length of the curve and outer tracks.

A few patents have been granted for brakes for railroad cars. One of these is for a mode of operating the brakes of all the cars at once, by a combination too complicated to describe in this place; and the other is for a brake placed upon wheels, and which operates more especially to prevent the cars from sliding backwards upon the grades.

Several patents have been granted for improvements in axles and boxes for carriages, &c. One of these patents is for placing in the positions sometimes occupied by friction rollers, toothed rollers, whose teeth come to edges on the outer circumference, which work into corresponding teeth on the axle and the interior of the box, thus substituting the "knife edge" for the rubbing surfaces usually employed.

Letters patent have also been granted for devices connected with locomotives for watering the track to prevent the rising of dust. It is said that the benefit which the machinery connected with the train derives from this device, to say nothing of comfort to passengers, fully compensates for the expense.

CAR WHEELS.

Great exertions have been made during the last eighteen months to improve cast iron car wheels. They are so much less expensive than wrought iron wheels that their substitution is a matter of great importance. There would be no difficulty in fixing upon the proper form for them, if they could be cast without cracking or straining to an injurious degree; but the chilling of the tread, and the various thickness of the different parts, &c., prevent the wheel from cooling in all parts at the same time, or with equal contraction. It is necessary, therefore, that the most desirable forms should, in some degree, be sacrificed to allow compensation for unequal shrinkage; and that compromise between the most desirable shapes for the wheels and those best calculated for compensation, which will produce the best combined result, is what most inventors in this branch of manufacture are seeking. Numerous experiments have been tried for the purpose of establishing the theories on this subject, with more or less success; but no form of wheels cast in years past seems to give universal satisfaction. Something new is constantly sought.

It has often happened that wheels cast apparently in accordance with sound principles have failed, while others apparently less philosophical in their construction have answered a good purpose. It has therefore not been deemed expedient to be governed wholly by theories, but to grant patents for such changes of form as appeared to *promise* usefulness, leaving the questions of practical utility to a practical public.

Some twelve patents have been granted within the year for improvements in car wheels; a much larger number than usual, compreheding a variety of curved plate, and curved spoke wheels with chilled rims and solid hubs, and for wheels whose hubs and rims are supported by a combination of plates and spokes, both curved in the peculiar manner deemed most expedient by their respective inventors. One would think, after what has been done, that so limited a field was entirely occupied, and that a sufficient variety had already been produced to test the question fully, whether any, or what cast-iron car wheel, will answer the purposes for which they are intended, to the satisfaction of the community.

It is unnecessary for me to give a detailed description of the several inventions above mentioned. It would lead me too far, and they will generally be understood by reference to the claims.

CIVIL ENGINEERING AND ARCHITECTURE.

Upon examination of the patents granted within the year belonging to this class, I find none requiring particular notice which were examined while I had charge of the class. Several of them are re-issues of patents for inventions heretofore noticed. I shall therefore leave the analysis of this class entirely to my colleague to whom it has been transferred.

MILLS.

Upwards of twenty patents have been granted within the year for improvements belonging to this class. They are principally for horse powers, and for improvements in mills for crushing and grinding.

Letters patent have been granted for a mode of preparing wheat for grinding. It consists in moistening the exterior coating of the wheat by steaming or otherwise, and then subjecting it to friction in any convenient way; whereby the outer covering of the grains, which ordinarily produces bran in grinding, is entirely removed, and nothing but the clean kernel is left ready for grinding.

Letters patent have been granted for an improved form of cogs for racks and pinions, and also for a mode of transforming a lathe so that it may be used for cutting the teeth on cog wheels, &c.

Letters patent have been granted for an improved cider mill, which consists principally of four toothed rollers standing upright in the four corners of a square, each working into two of the others, the whole resting on a perforated plate, with receptacles below for the cider, &c. The apples are placed in a hopper in

front of the first pair of rollers, and are by them drawn in and crushed; and the pumice is carried by them into the space between the four rollers, where it is worked and pressed until it is carried out at the side by the action of the rollers, where it is permitted to fall out of the mill. Thus the apples are ground, the cider extracted, and the refuse discharged by the same operation.

Letters patent have been granted for an improved hydraulic machine, for transmitting power from one point to another. The apparatus consists of two cylindrical vessels, each having a tight partition from the axis to one side of the vessel. A piston on a shaft passing through the centre of the vessel is also placed in each, which with the partition divides the vessel into two parts; either of which can be enlarged, while the other is contracted by moving the piston, which may be done by a crank on the shaft. The compartments in one of these vessels are connected, each with its corresponding compartment in the other, and the whole apparatus is filled with water. It will readily be perceived that, with little power, the motion of one of these pistons will, through the water, be communicated to the other.

Five patents have been granted for improvements in horse powers, some of which were examined by my colleague.

In one of these horse powers, the pinions which carry the endless chain are placed loosely on their shafts, and are attached to the ends of a bar at points near their peripheries. This bar is connected to the middle of the shaft of the pinions by a pin on which it swivels. Thus, when either pinion receives more than its proportion of strain, it yields and throws the excess on the pinion connected with it by the bar.

Ten or twelve patents have been granted within the year for improvements in mills for crushing and grinding.

One of these patents is for improvements in the bush. In this the bush traverses up and down in the opening in the bed stone; its diameter in the middle is somewhat greater than at the ends, to permit slight vibrations of the shaft without injury. The opening through the bush is slightly conical, and that part of the spindle which passes through it corresponds in form, so that it can always be kept close as the parts wear, by raising or depressing the bush, which is sustained by a lever and a fork, and is elevated and depressed at pleasure. Some improvement is also made in the mode of oiling the spindle.

Another patent has been granted for dividing the shaft, and giving the part upon which the spindle is a separate support, and so connecting the lower part of the shaft with the upper that they will revolve together; but the lower part may vibrate without transmitting its vibrations to the upper part and the spindle.

A patent has been granted for improvements in crushing and grinding mills. The corn in the cob placed in the hopper is broken and ground by two horizontal toothed cylinders, working against each other and against toothed concaves. The first roller is small and moves slowly, and its teeth work between those of a concave at the mouth of the hopper. This is for breaking. Imme-

diately below the first roller is a large one, revolving rapidly, its teeth working first between those of the first roller, and farther around into the teeth of an adjustable concave. This is for grinding. The surfaces of the two rollers, where they work together, move in the same direction; the large roller moving much faster than the small one. Thus the rapidity of the action increases as the corn progresses towards the completion of its grinding. There is first, the slow motion of the small roller against its concave, then the differential motion between the two rollers, and finally, the full speed of the large roller acting against its concave.

An improvement in mills for grinding has been patented, which is as follows: The first grinder is a sphere revolving upon trunnions. Upon this is placed a concave grinder, fitting it down to the trunnions, and a hollow shaft, projecting upwards, is properly sustained at the top. One of the trunnions of the spherical grinder is connected with the shaft of the second grinder by cog-wheels. The feed is through the shaft of the second grinder. Motion is given to this shaft, and from it both grinders are caused to revolve, their motions being at right angles to each other.

An improvement has also been patented in the mode of setting bed stones. The rigid manner in which they are generally set renders them liable to injuries from the jars occasioned by the operations of the runner. To obviate this inconvenience the bed stone is made to rest upon the ends of set screws, and is held to its place by a spring connection, which allows the necessary compensation.

Letters patent have also been granted for a new mode of manufacturing mill stones, and for a new mode of drawing in the air between the stones for cooling.

Further remarks upon this class are deemed unnecessary.

METALLURGY AND MANUFACTURE IN METALS.

Although numerous patents of this class have been granted within the year, but few of those which were examined before it was transferred to Mr. Renwick require particular notice in this report.

Letters patent have been granted for improvements in machinery for the manufacture of lead pipe. Heretofore, when the pipe has been made of metal in a "set" state, a bridge has been used to support the core, and the metal above, being separated by the arms of the bridge, necessarily required great pressure after passing it to be welded together. In the machine above mentioned the cylinders for holding the metal are placed on opposite sides of the core, and there may be two or more of them, and the core is sustained above the metal. The cylinders being filled and the metal set, the pistons are forced forward simultaneously, driving the metal before them, equally sustaining the core by equal pressures, while the metal rushes out in a direction perpendicular to the cylinders in the form of pipes. No bridge being used, and no separation of the metal taking place, all the disadvantages arising therefrom are avoided.

Letters patent have been granted for an improved method of casting large rolls. It differs but little from processes heretofore used, but in these operations slight changes in the mode of casting produce important results. The mould is placed in an upright position, and the melted metal is poured into a vertical tube as high as the mould. This tube communicates with the mould by a horizontal pipe at the bottom, in a direction and position tangential to the mould. This causes a constant whirl in the melted metal within the mould, which tends to throw the pure metal, by its superior weight, to the outside of the mass, and the scoria and other lighter matter to the centre. A skimmer is used also as an auxiliary. It is kept constantly at the surface of the metal as it rises in the mould, and in such position as to direct the scoria to the centre as the metal whirls in the mould, so that when the metal chills the exterior will be perfect. To cast perfect rolls has always been a matter of difficulty and delicacy, and it is said the mode above described is very successful.

Several patents have been granted for improvements in common spoons, having for their object increased strength and economy of the article; for improvements in bench vices for ensuring parallelism of the jaws; for improvements in the manufacture of wrought nails, spikes, &c.; also for improvements in welding iron pipes.

Letters patent have been granted for an improved apparatus for rolling puddlers balls. The ball is supported by two toothed rollers, revolving in the same direction, so that the mass will revolve instead of passing between them. Above is a cam-shaped toothed wheel which also operates upon the mass. At one end of the rollers there is a plate, against which the mass, as it is worked, abuts, and at the other a hammer, which acts at intervals for upsetting.

Letters patent have also been granted for beading sheet metal. This would be easily effected by winding the end around a small rod. But the rod would spring and the bead would be imperfect. To avoid this difficulty the rod above and below it has dies which open and shut at pleasure, which leave sufficient space around the rod for the thickness of the sheet, and prevent springing as the sheet is drawn in and beaded.

With these few notices I shall dismiss this class to be further treated by my colleague.

HYDRAULICS AND PNEUMATICS.

Examinations in this class have not been so numerous in proportion during the year as in some others, and a very considerable number of applications still remain unexamined.

WATER WHEELS.

Some six or eight patents have been granted for improvements in water wheels, but the distinction between them, and others in previous use, are not very broad. Different kinds of water wheels are, of course, best adapted to different circumstances; and when a

particular kind of wheel is generally used in a given district of country—if another, after experiment, is thought to work better—it is at once considered a new invention, without reflecting that the same may long since have been used elsewhere; or that a difference in a supply of water, or the head or various other similar circumstances, having nothing to do with invention, may be the sole cause of the difference of action. Rejections in this class, for want of essential novelty, are always numerous, and the improvements patented seldom present much novelty.

Letters patent have been granted for a wheel which has the position and general form of an over-shot wheel. The rim of the wheel is supported by arms at one of its ends or edges only. It receives the water on the inside, nearly on a level with the axis. The buckets are V shaped in their cross section, the outer side being the highest. As the wheel revolves, and the buckets descend, they become capable of receiving and retaining the water which falls from the bucket above, which is being filled. The form of the bucket prevents the water from falling outside, and causes its capacity to increase as it descends, so as to receive and prevent the waste of the water falling out of the upper buckets. Under peculiar circumstances, this wheel would answer a good purpose.

In another wheel patented the water is received on the outside of the wheel upon two sets of buckets which meet, forming crusps along the middle of the rim, and is discharged on both sides. The shute is divided into two parts, in such a manner as to direct a portion of the water immediately upon the wheel, and to conduct the rest nearly half way around before it strikes the wheel, thus causing nearly all the buckets to be in action at the same time. It is not easy, without drawings, to show the difference between this wheel and some others, which would answer nearly the same general description. Most of the modifications made in water wheels, for some years past, are little else than mere changes of form without invention or advantage. This remark is true to such a degree as to leave the impression that the subject is nearly exhausted.

RAISING WATER.

Some fifteen patents have been granted within the year for improvements in pumps and other machines for raising water; but in general, they present but little novelty, and very precise descriptions of them would be necessary to distinguish them from those previously known; and such descriptions as could be given of them in this place would not be generally useful.

Letters patent have been granted for an improvement in tilting buckets for drawing water from wells. A fixture is attached to the curb for catching the edge of the bucket and tilting it as it rises, but the bucket will not always present the proper side to the hook for tilting. To ensure the proper position of the bucket, a flat strip of wood or metal is placed in the chain, not far above the bucket, which passes through a guide with friction rollers, and turns the bucket into the proper position.

Letters patent have been granted for an improved pump, constructed as follows: The space within which the piston works is a sector of a cylinder, and a flat piston vibrates in it upon an axis passing through the centre of the cylinder, of which the chamber is a sector. Above this axis is a chamber with which the pipe for the discharge of water communicates. Near the bottom of the sector are valves for the admission of water. Near the edge of the piston next the shaft, is an opening through the piston to the lower edge of which a valve is hinged. There is also a corresponding opening through the shaft, for the passage of the water from the sector to the upper chamber. As the piston vibrates, the valve also vibrates, alternately opening and closing the passages from each side of the piston to the upper chamber. This machine is a decided improvement upon those acting upon a similar principle which have heretofore been used.

A patent has been granted for an improvement in the Archimedean screw for raising water. The distance between the thread diminishes towards the top, and the screw and reservoir are so arranged at the bottom, as that the screw shall receive a portion of air with the water at each opening which is driven along up the screw. By these combined arrangements the water may be discharged in a jet to a considerable distance above the apparatus, by the air compressed at various points of the screw.

Letters patent have also been granted for an improved arrangement of pumps, to supply and operate the hydraulic press. Any convenient number of pumps may be used. When the press commences its operations in many cases, the resistance is comparatively slight, and a rapid supply of water is necessary; as the resistance becomes greater, equal or greater power should be applied, but the supply of water should be less. In the above apparatus, the pumps are so combined that one after another they cease to furnish their quota of water as the resistance increases, and the principal part of the power is exerted to operate the pumps which continue to furnish water.

Letters patent have been granted for improvements in lock gates; for improvements in stop cocks and molasses gates; also for improvements in filters to operate on a large scale, and for improvements in stop cocks and filters combined; but a particular analysis of them is not deemed important.

MACHINERY FOR WORKING IN LUMBER.

A considerable number of patents have been granted during the year, for improvements in machinery belonging to this class; but not enough to do justice to the class. A large number of applications belonging to it still remain unexamined. In general, the inventions patented this year in machinery for working lumber, are not so interesting as in some former years; though this remark does not apply to all.

STAVE, SHINGLE, AND LATH MACHINES.

Some ten or twelve patents have been granted within the year, for improvements in machinery for the purposes above indicated. Some of these are too complicated to describe in this place, and the description of others would not be interesting. Few radical improvements have been made in this variety of machinery; but inventors seem to confine themselves to slight refinements upon machinery heretofore used.

Difficulty has always been found in planing or smoothing rived staves. Their surfaces are usually warped and twisted, and the ordinary planing machine would destroy instead of finishing them. Several attempts have been made to smooth them with various success. Two patents have heen granted within the year, for improvements in machinery for dressing this kind of stave. One of them has the general appearance of the planing machine; the device which drives the stave forward is such as to allow it to turn to accommodate its shape. At the point where the cutting takes place, the stave is pressed, by rollers working against it near its edge, to the rest. These rollers are used, instead of the long ones generally used in planing, so that they may properly press the stave irrespective of its shape, so that whatever may be the position of the stave at other points, it is properly presented to the cutters at the points operated upon. When the stave is partially dressed, it is seized by gripers at the other end, which allow it to turn and draw it entirely through. A full idea of the machine cannot be given without drawings. In another patented machine, the rived stave is pushed through between stationary cutters, in such a manner as to allow the stave to turn, to compensate for its irregularity of form.

An ingenious machine has been patented for sawing clap-boards. It would be impossible to give a full idea of it without drawings, but its principal object is to give the various travelling and vibrating motions to the carriage for the purpose of sawing up the whole block, and giving the proper shape to each of the clap-boards without waste.

Letters patent have been granted for an improvement in sawing out blanks for spokes. The round block, as it is sawed from the log, is split as nearly through the middle as possible, and one-half of it is held by points between two posts rising up from a carriage. One of these posts is hinged so that it may be inclined backwards; and if the grain of the wood is winding, this inclination will bring the lower edge of the block parallel to one of the saws. Two saws are used, one for sawing a kerf towards the centre of the block, and the other for finishing the separation of the blank from the block. As each blank is separated, the block is partially revolved for another cut. When the whole convex exterior is thus cut off from the block, it can be lowered, and commencing as before, another set of blanks may be sawed, and another until the block is entirely sawed into spoke-blanks. By the arrangement of machinery above described, it will be perceived that blanks may be

sawed from blocks having a winding grain, nearly in the direction of the grain.

TURNING REGULAR AND IRREGULAR FORMS.

Several patents have been granted for this variety of work in lumber. One of these is well adapted to working blocks of timber into forms whose cross sections are polygonal, but varying in thickness from end to end, according to any desired pattern. Piano legs, &c., may be dressed by it. The block is turned at the proper intervals by self-acting machinery, without the care of the attendant. Another is adapted to spiral fluting along a surface of a block varying in diameter from end to end. The cutters in both of the above machines operate with the grain.

Letters patent have also been granted for improvements in machinery for turning small rods, such as hoe handles, rake handles, &c., which are liable to bend in turning. The knife used cuts the whole length of the rod at once; and to prevent torsion, the mandrels are driven by pullies at both ends; and to prevent bending, rests are so connected with the knife as to be brought up to the support of the rod in proportion as the cutter is brought down upon it.

PLANING MACHINERY.

But four or five patents have been granted within the year for improvements in this variety of machinery. Numerous applications, however, are still pending.

One of these is for dressing mouldings. A thick plank is slitted in such a manner as to leave each part nearly in the form of a triangular prism, and then placed in the machine, which has the general appearance of a common planing machine. A rotating cutter is used of proper form, to give the required shape to the moulding as the plank passes under it; and a smoothing plane or cutter, behind the revolving cutter, also operates upon the same and dresses it as it passes. The upper feed roller is formed of toothed rings of various diameters on an arbor, which are changeable at pleasure. These rings are so arranged as to operate in feeding upon those parts of the surface, which are to be removed by the cutters without injury to the others.

Letters patent have also been granted for improvements in reciprocating planing machines. The machine is too complicated to be fully described. After the plane has made its cut, it is by a new combination of machinery, raised from the board and returns to its position and is again brought down upon the board. Support is given to the board while under the plane, and between the tongueing and grooving cutters, by bars with springs between them, which spread or contract according to the width of the board.

Letters patent have also been granted for an improvement in the hand plane. The lower side of the plane stock is made convex

from end to end, and a flexible plate is placed over this convex surface, and firmly attached near the point where the plane iron passes through. The extremities of this plate are so connected with the plane stock that they can be forced down and held at any point required. The face of the plane is thus made of a variable form, so that plane, concave or convex surfaces, can be smoothed by it at pleasure.

Letters patent have been granted for improvements in bench hooks; for improvements in machinery for cutting screws in posts and rails of bedsteads; for improvements in boring and mortising and tenoning; for cutting figures out of veneers; for improvements in chucks; for improvements in machinery for sawing timber, &c.

Letters patent have also been granted for improvements in machinery for making match splints. A perfect idea of this machine cannot be given in this place. The blocks, as they pass through the machine, are crimped or matted on one end, so that splitting them at the other into splints will not separate them on the matted end, but will leave the mass of splints in such a condition that they may easily be separated afterwards. The action of the splitting knives, by an ingenious contrivance, is regulated by the resistance, so that when the splints are split far enough—so far as to hold together only by the matted part—the resistance ceasing, the knives advance no farther.

A more detailed analysis of the improvements patented in this class is deemed unnecessary on the present occasion.

MISCELLANEOUS.

Some twenty-five patents have been granted for improvements which, as they are not referable to any of the other classes, belong to this. This class is now under the charge of Mr. Renwick. Few of the patents granted, while I had charge of the class, require particular notice.

One of these patents is for a mode of saving property in stores, counting-rooms, &c., in cases of fire. The shelves, counters, desks, &c., are placed on rails instead of being connected with the room, and so held in their places as to be easily disengaged, and left free to move towards the doors. The doors are so arranged that, when opened, the principal fixtures above mentioned, with their contents, may easily be run out into the street.

Letters patent have also been granted for a self-setting trap for animals. A small platform is held in place by a spring catch so that the animal may stand upon it without disturbing it. This hook is so connected with a fixture under the bait-holder, that when the animal attempts to take the bait the hook releases the platform and it tilts. The bait is so placed that the animal cannot reach it without getting into a position in which he can make little exertion to save himself; and, therefore, when the platform tilts, he falls into a box or pit below. The platform, relieved of its weight, falls again into its usual position with the other parts, is again caught by the latch and the trap is set as before. The trap remains

baited, because the animal falls in the unsuccessful attempt to reach it.

Letters patent have also been granted for saving animals confined in stables in cases of fire. It consists principally in a device by which, at one end of the stable, on opening the door, turning a crank, pushing or pulling a slide, or by any other similar means, all the animals are at once and in a moment released from the rack. But it is unnecessary for me to proceed further in the analysis of machinery patented within the past year. Although many patents have been passed over without particular notice, yet enough of them have been mentioned to give a sufficiently full idea of the progress of inventions, and the character of improvements which have been referred to my desk.

In conclusion, allow me to make a few remarks upon the progress of business. In the year 1844, the one immediately preceding the commencement of your administration of the affairs of this office, the number of applications increased over any preceding year about twenty-five per cent., and unusual exertions were made to keep up the business. At the close of that year there was a small accumulation of business in the classes now under the charge of Mr. Renwick and myself.

During that year the aggregate of patents and rejections in those classes examined by my predecessor, was............. 408

Whereas, the aggregate of patents and rejections examined by Mr. Renwick and myself—one of us laboring the whole year, and the other about six months—was.................. 902

An increase of results, in proportion to the time and force, of nearly fifty per cent., notwithstanding the accumulated difficulties with which we have been obliged to contend.

Respectfully submitted, by

W. P. N. FITZGERALD,
Examiner of patents.

To honorable EDMUND BURKE,
Commissioner of patents.

F.

United States Patent Office,
January, 1849.

Sir: In accordance with your instructions, I have the honor to submit the following report, relating to the duty performed by me under the appointment you were pleased to make in June last, and also giving some idea of the progress of American invention in those classes of the arts which it has become my duty to act upon.

On entrance upon my duties, one-half of the classes formerly entrusted to Mr. Fitzgerald, were allotted to me, and we, for a time, acted in concert upon such sub-divisions of classes as first presented themselves in order for examination.

Under this arrangement our reports have been, with the exception of the last two months, made in common, not reporting specially upon the amount of duty performed by each. In the numerical statement, to be found in my colleagues report, it will easily be perceived, on inspection, that almost double the amount of cases have been acted upon during the last six months, by us in concert, when compared with the number acted upon by him alone.

During this time a final division has been made, and classes No. 2, metallurgy; No. 6, steam engines and boilers; No. 7, navigation, etc.; No. 9, civil engineering and architecture; No. 19, fire arms and implements of war, and No. 22, miscellaneous, have been allotted to me.

I will now proceed to notice briefly, and succinctly in the extreme, some of the inventions which have been examined by me, premising that such notice will not extend to all the cases so acted upon, and also that those omitted are so merely on account of want of time, and not because they may not be, from their ingenuity and utility, equally worthy of comment and explanation.

Those cases acted upon by me, before a division was completed, and which are among the classes now appertaining to Mr. Fitzgerald, will first be noticed.

Among fences, a patent has been granted for a flood fence, the characteristics of which may be described as follows: Posts, having a series of notches, open on the down stream side to receive the rails, are placed in the ground in the usual manner. One end of all the rails in each pannel is attached by two staples to the bottom or end of these notches, so that it may sway freely about when acted upon by the current of water. To the top of each post a stick of timber, of the same length as the post, is attached by a hinge, which piece is so arranged that when the free ends of the rails are placed in the notches, each on top of the fast end of the rail in the pannel preceding, then these sticks of timber shall hold all the rails in place. To the piece of timber attached to the post at one end of the fence, a trigger is fastened to be acted on by the

pressure of the flood, and when the water rises, this trigger trips the first piece of timber, which loosens the rails in the first pannel; the lower rail in this pannel trips, by a trigger, the piece of timber attached to the second post, and so on through the whole series. Other patents have been granted for an improved method of fastening the wires of a metallic fence to the posts, and for an improved hurdle fence, which can be very easily taken apart and carried, detached from the posts, to any required position.

Patents have been granted for two horse-powers, one of which is constructed wholly of iron, and has cogs upon the periphery of the pedestal, which supports the whole apparatus, acting upon a pinion whose axis is in the arm to which the animal is attached. Another pinion in the same shaft, is in gear with a third cog wheel upon an axis concentric with and inside of that upon which the working arm revolves. The whole arrangement is compact, strong, and simple. The other horse-power is the well known one of the vertical wheel, with the animal moving in its inner periphery. The novelty consisting in a contrivance, by means of which a governor is made to control the position of the animal, and consequently the amount of its effective force. Pinions, axles, screws, etc., act upon the halter and the splinter bar to which the animal is attached, causing him to mount higher along the inclined inner surface of the wheel as more work is required, or backing him down to the lowest portion of the cylinder when the least amount of labor is to be performed.

Among machines for raising water, an arrangement of a bucket with a valve in its bottom, and certain devices for lifting it and throwing it out of the line of the shaft, through which it has been hoisted, has been patented. This contrivance is peculiarly adapted for raising water from artesian wells, where they are too deep to admit of the common pump, and its use is said to be increasing in limestone districts of the western States where such wells afford the only supply of water.

A patent has been granted for a double acting force and lift pump, all the valves of which are contained in the bed plate of the machine, they are flap valves, and so arranged that the same piece of leather acts as hinge and packing for them all, besides serving as packing between the cylinders and bed plate. A water ram may be noticed, the valves of which are so constructed that a small ring of water is continually kept between the valve and its seat, thus preventing the slamming and consequent wear, which is the case in valves of the ordinary construction.

In the class of land conveyance, there have been many patents granted, most of which have been acted upon by my colleague. There is one only of those that have been under my notice of which I desire to make mention. It consists of a very simple contrivance for mitigating the injuries to which horses attached to carts are subject when drawing loads over rough pavements, these injuries arising from the constant jar upon their backs of that portion of the load which is thrown directly upon the horse. By

placing a spring beneath the shafts or thills, and attaching the back chain to it, the horse is relieved at once.

In the class of metallurgy many improvements have been made during the past year, the greater portion of which relate rather to manufactures in metal than to improvements in the production of the metal itself. Among those cases which relate to the production of a certain variety of the manufactured metal, one patent, that has been granted for improvements in the manufacture of sheet lead, demands particular attention. The idea upon which the process is based is simple in the extreme, and when the plan has been elaborated and brought into execution, it appears wonderful that the same idea should not have presented itself before. In the ordinary processes for rolling sheet lead, the metal is first cast into a thick slab or flat pig, which is passed between rollers that revolve alternately in different directions, dragging the lead through them, first from the right hand and then from the left. In this process continual interruptions take place from the necessity of reversing the motion of the rolls, and a cumbrous and expensive apparatus for supporting and traversing the sheet in process of manufacture must be used. In this improved process the lead is cast into the shape of a hollow cylinder, which is slipped over a cylindrical roll, another roll is then brought in contact with the cylinder by means of screws or some similar device, and the two are moved with a continuous rotary motion; it is obvious that as the lead becomes thinner, it will no longer exactly fit the cylinder upon which it was placed, but hang down below it like a loose band, continually increasing in length as the rolls are approached and the sheet becomes thinner. When the sheet is sufficiently thin it is only necessary to slit it and detach it from the roll. Several mechanical devices have been devised for carrying this idea into practice, and some ingenuity has been required to arrange the rolls, the method of supporting them and of enveloping one of them with the cylinder of lead.

Letters patent have been granted for a process for restoring their shape to steel springs, the novelty in which consists in binding or clamping the spring into a mould after it has been hardened and the temper drawn; it is then, while still on the mould, dipped into a bath of fusible metal and the proper temper given to it. By this process, truss and other crooked springs of the like character, may be obtained with great certainty in any variety of shape, and as they are not secured on the mould or pattern until after they are hardened, all danger of unequal tempering arising from the water not having free access to all surfaces of the steel is avoided.

A patent has been secured for certain novelties in the method of moulding iron pipe, which consists in forming the cores and moulding of the patterns by means of machinery. The cores are formed between four wooden surfaces, constituting when forced together a cylindrical core box. The sand is thrown on to the bottom strip of wood and between the two side pieces, the top is then forced down towards the bottom, and the two sides are pressed towards each other. It should have been premised that the precise quan-

tity of sand necessary to form a core of any given size is determined by experiments, and this quantity thrown in by measure as before described. The patterns are placed on bottoms, or secured to match plates in the usual manner; the cope or drag turned over them, and a quantity of sand determined by measure thrown in, which is then compressed by machinery into the flask. It is obvious that this process must necessarily be confined to pipe of small calibre, and it is stated that gas or water pipe, for house service and the like purposes, may in this way be cast with great cheapness and sufficiently strong and neat.

A process for welding or attaching pieces of wrought iron or steel to iron castings, during the process of casting, has been discovered and patented. In the ordinary method, pieces of wrought iron are heated in a furnace, and while hot are placed in proper position in the sand forming the mould. This process is difficult of execution, for two reasons: first, that the heated iron is difficult to handle, and to be placed in position with accuracy; secondly, that, during the handling, and the time necessary for closing the flask, the wrought metal becomes so much cooled as to render the process uncertain. These difficulties have been obviated by placing the wrought iron in the flask while cold, and constructing in the sand a cavity, one side of which is formed by one or more surfaces of the iron that is to be attached. A gate and outlet are provided to this cavity and melted iron is poured in, and repoured, if necessary, until the heat it parts with in cooling sufficiently heats up the wrought metal which is to form a part of the finished article.

Two patents have issued for improvements in bending the skelp, or ribbon of metal, from which iron tubes are to be formed by welding their edges together. One process consists in attaching behind the finishing rolls that form the skelp, two pieces of metal, which are so shaped and secured to each other, that a straight horizontal slit is left between them at the ends nearest the rolls, while at their other extremity the orifice is circular, with a core or mandrel in its centre. The straight slit changes gradually in the interior of the tool to a semi-circular one, and here the core commences also semi-cylindrical, and is gradually changed into a cylinder, as the slit by degrees encompasses it. The skelp, as it leaves the rolls, is by them forced through this tool, and when it leaves it has the shape of a tube with a slit extending its entire length; it is only necessary to weld the edges together and the pipe is completed. The other method consists in passing the skelp between the jaws or dies of two tongs, as it is drawn from the heating furnace. The novelty consists in the shape of the dies, which are so constructed that they, by their joint action, shape the tube, which is passed through them, not only as it would be if clasped in ordinary tongs, but also at right angles to that direction. It is difficult to give any clear idea of the shape of these dies without the aid of a drawing or model.

The use of wrought iron tubes is daily increasing, and numerous efforts are making, both in this and in other countries, to simplify,

improve, and cheapen the process of manufacturing them. Old gun barrels were, in the first instance, and at no remote period, bought up and used as gas and water pipes, but at the present day, iron tubing has been applied to so many useful purposes, that large manufacturies have been constructed solely for this particular branch of the iron trade, and the size of the article has been increased from that of the ordinary musket barrel to that necessary for the flues of marine steam engine boilers.

Numerous improvements have been made in locks, fastening of all kinds, hinges and springs; some of them complicated, others simple; some of them, on their very face, showing that much mechanical skill was required for their invention, others slight variations of single ideas, which nevertheless serve important purposes when used in practice, whether considered with reference to facility of manufacture, or as adding to the convenience of the consumer.

Two powder proof bank locks come under the former of these divisions. One of them has circular, the other vibrating tumblers; in one, the key is pushed in and turned round on the inner periphery of an iron ring, before it begins to act upon the tumblers or bolt; in the other, the key is completely covered by the handle or knob before it commences to shoot the bolt; in both it is impossible for a lock picker to try the tumblers, and keep a constant pressure on the bolt at the same time, thus presenting one great obstacle to their being picked. In both of them, the latter particularly, the exterior openings are so arranged and so minute, that it seems impossible to introduce a sufficient quantity of powder to blow the lock from the door. In another lock, for the same purpose, highly magnetized tumblers are used, placed with their opposite poles in contact, and by virtue of their magnetic attraction and a peculiar spring shape given to them, so combined that it is difficult to move any single tumbler with a false key, without forcing the one with which it is paired into the same position.

Two front door locks have been patented, with numerous ingenious contrivances for safety, but too complicated to be understood without the aid of drawings. Notice should also be taken of what is termed a portable lock, intended to be fastended to any door by means of a screw attached to it, for which and another screw serving as hasp, the lock itself serves as a driver. This lock, when so adjusted, may be locked and unlocked in the usual way, and detached from the door at the pleasure of the owner. It affords additional security to travellers, and must come into use in those sections of the country where hotel doors with permanently attached locks are as yet a rarity.

Several patents have been granted for sash bearers, sash fasteners, door springs, &c., some of them simple, compact and convenient, but not demanding a notice in detail.

A convenient, combined blind hinge, opener, shutter and fastener, has been patented. This contrivance is so arranged that the mere turning of a knob inside the house opens or closes the blinds and fastens them in either position. The knob is connected by a rod

passing through the wall with a saucer shaped piece of iron, which surrounds the spindle of the hinge, and is situated between the upper and lower hinge. The upper portion of the hinge is provided with a friction roller that travels upon the saucer, and spring bolts falling into catches are attached to the blind, or catches are provided into which the blind itself may drop. If the blind be closed and fastened, the knob is turned in such manner as to tilt the saucer above described, so that a portion of its periphery nearest to the point of meeting of the two blinds is elevated. This motion lifts the blind out of the catch which holds it shut; the blind then rests through the roller upon the saucer, which is now a circular inclined plane, and the roller running down, it opens the blind and throws it against the wall, where the spring bolt catches and holds the leaf open. By reversing the motion of the knob, making the opposite portion of the periphery of the saucer highest, the blind is lifted, the catch last mentioned is disengaged, the leaf closes and falls into the clasp holding the blind shut.

Among tools and cutlery, two improvements demand notice; one being an improved wrench, by means of which a cylindrical bar or nut may be turned. The characteristics of the implement, are first, the peculiar form of the inner face of the outer jaw which is hooked shape; and second, the method of securing the inner and moveable jaw in its position. The last is secured to the slider by a pin, so that it may be moved outwards a certain distance from the wrench handle in such a way that a line passing through its centre shall be inclined to a line passing through the centre of the handle. The face of this jaw is not perpendicular to a line passing longitudinally through the handle, but inclined in such a manner, that that part of its plane farthest from the handle is nearest to the outer jaw. If a cylindrical rod be grasped between these jaws, by means of the screw common to all wrenches, and the wrench turned towards them, the bolt is then tightly griped and forced to revolve; when the wrench handle is turned in the other direction, the nut or rod slips down the inclined plane above described, the swinging jaw turns towards the handle, and the wrench moves over without turning the rod.

The improvements referred to in the construction of table cutlery, consist in shortening the blade of the knife, placing the bolster at the end of the blade, and then making a short tang which forms the connexion between the blade and the handle. In the finished article the blade and tang together are of the same length, as the blade in the old fashioned knife, but the bolster is so much nearer the centre of the whole article, and the distance from it to the end of the handle is so much greater than usual, that the knife is what is technically termed a balance knife, without the necessity of weighting the handle. Expense in manufacture and risk of splitting the handle while in use are thus avoided.

The improvements made in screw machines, consist generally in modifications rendering the machinery less complicated; and those in nail, rivet, and spike machines are not such as can easily be explained in a mere description. A new feature has been introduced into one of the bolt machines, in which the bolt, instead of being

headed by one griping and compression, is successively acted upon by the header and side-holders, thus imitating in a measure the method in which bolts are formed by hand.

A very singular horse-shoe nail machine has been patented, in which the heated rod of iron is passed between rolls having a combination of a sort of groove and indentures on the periphery which gives shape to the nail. But these grooves are not formed in the roll itself, but in sort of staves or segments, the breadth of several of which is not greater than the length of one nail. These staves are L shaped, with the end of one arm fastened to the heads or ends of the rolls, and the other arm resting on their peripheries. As the rolls revolve, the outside right angled corner of these L strike cams or friction rollers, which force the staves on the top and bottom roll towards each other, and the nail is formed; two of its sides from the compression due to the main rolls, the two other sides by the pressure arising from the staves being forced towards each other by the friction rollers above described.

In the class of steam and gas engines, patents have been granted for an improved condenser something similar to the well known one brought into use by Hall, as far as the condensation of the steam without the use of injection water is concerned. The tubes of this condenser are arranged something after the manner of a worm, and a partition is placed in the cistern near its top; above which one or more coils of tubes or their equivalents are situated. Water is kept on top of this partition, which is renewed from time to time, and a connection is formed between the water there contained and the lower part of the worm, while below the partition water is kept in continual circulation for the purpose of condensing the steam. The action is as follows, it being premised that the condenser is to be applied to marine engines using salt water in their boilers: As the steam passes through the tubes above the partition it heats the water surrounding them, a portion of it is converted into steam, which passes through the connexion above mentioned, and is condensed along with the steam escaping through the exhaust valves. It is obvious by this arrangement, a continued supply of fresh water may be furnished to the boilers without any additional consumption of fuel.

A patent has also been granted for a method of setting steam boilers; the novelty consisting in a peculiar arrangement of the fire bridges, and in the introduction of currents of air through small apertures in the same, and in the side walls of the furnace beyond the bridges. By these currents the gaseous products of combustion are kept in motion in such a manner that they pass to the rear and return again to the front of the boiler, without the necessity of employing return flues, while at the same time these gaseous products are almost entirely consumed. Economy in fuel is promoted, and the annoyance arising from smoke in a measure prevented by this apparatus.

Patents have been granted for a water door applied to boilers, and for various cut-offs; also, for a method of regulating and controlling steam power, by means of which the force furnished by

steam can be applied (with the intervention of only a cylinder, piston and piston rod) directly to punching, working valves, bending iron, and the like purposes.

A patent has also been obtained for applying to a useful purpose the force furnished by the rush of cold water towards the vacuum in a condenser, when condensation is effected by injection.

In the class of navigation and marine implements, a patent has been granted for a new theory for determining the models of vessels. In vessels constructed on this plan, all the curves that run fore and aft along the line of the dead wood are either circular or eliptical, and all the curves composing the outsides of the timbers or cross sections of the vessels are circular or eliptical; the theory being further limited by the fact, that the timbers of the midship section have in themselves the shape of every timber in the vessel; or, in other words, suppose frames precisely alike set up along the top of the dead wood, and their tops sawed off to correspond with the line of shear, and the vessels planked up on such timbers.

Patents have also been granted for propellers of various kinds; for methods of steering vessels without the use of tiller ropes; and for interposing springs to deaden the shock arising from seas striking the rudder, and for an improved gun harpoon.

A life boat is also deserving of notice, the sides of which are formed of flexible material, and double, thus permitting the boat to be folded and packed into a small compass, while at the same time the double sides are distended, and the interval between them is filled with air when the boat is opened out and ready for use.

In the class of civil engineering and architecture, patents have been granted for a canal lock and appurtenances, so arranged that by pulling a line leading along the tow-path to some distance from the lock, water wheels are set in motion, which open and shut the gates as may be required.

Also, for a compound break-joint railroad rail, which seems well adapted to prevent jar upon cars and locomotives; and which also admits of the removal of the old and putting on a new upper surface, whenever such surface is worn out.

A railroad draw-bridge has been patented; it is on the swinging principle, and each particular string piece is hinged to the abutments, while the cross pieces are fastened on them in such manner by pivots that their angle of position to the stringers may change. By virtue of this arrangement the strings lie against each other when the draw is open, and occupy far less space than when arranged in the customary manner.

Patents have been granted for door springs, weather strips, and bell telegraphs; also for rock drilling machines, excavators, and mud machines.

In the department of fire-arms a patent has been granted for a very simple breech loading gun, which caps itself as the breech is brought into place. In this arm the breech is a solid piece of steel, which is forced upwards, between the end of the barrel and the stock, after the cartridge has been placed in position, shearing

off the end of the cartridge as the breech rises. This breech is wedged shape, and will keep tight even after long use.

Another gun has been patented in which an endless chain of cartridge boxes, each containing a single cartridge revolve over rollers on the stock. Each box, as it arrives opposite the open breech, has a cartridge forced from it into the barrel, the breech is then closed, the gun fired, and these operations repeated at will until the cartridges are exhausted.

An ingenious machine for charging percussion caps, too complicated to be explained without the aid of drawings, has been patented.

Also an apparatus for stopping shot holes in the sides of vessels under water; this machine is like an umbrella, strongly formed, and covered with water proof canvass. It is forced while shut through the hole from the inside of the vessel, the handle is then drawn back again, the apparatus opens, and the pressure of the water forces the canvass close against the sides of the ship, effectually plugging the hole.

In the class of general miscellaneous—a patent has been granted for a process, by which the fine dust and refuse coal, so abundant in the vicinity of coal yards, mines, and other places where this fuel is handled, and which is now useless, may be converted into a good fuel.

The process consists simply in subjecting the small particles to great pressure, after they have been placed in moulds; and from the specimens deposited in the office, it is perfectly evident, that even anthracite dust will after subjection to compression adhere together, and form a lump of as great specific gravity as the coal itself.

All of which is respectfully submitted.

HENRY B. RENWICK.

To the Hon. Edmund Burke,
Commissioner of Patents.

G.

Sir: In accordance with your instructions, I herewith communicate a report of the history and present condition of the business of the office committed to my charge.

I received from you on the first day of July last, the appointment of examiner of patents. But in consequence of the appointment of several assistant examiners made about the same time, who had not yet been initiated into the duties of their office, considerable time was necessarily consumed in aiding them in the first steps of their duties. I did not, therefore, take my room and enter upon the duties appropriate to my department as examiner, until the twenty-second day of August, 1848. Previous to this date, however, many cases were acted on and disposed of as will appear in the tabular view herewith presented.

The classes that have fallen to my share according to the present distribution are the following:

1. *Agriculture*, iucluding all instruments and devices for horticulture, agriculture, collecting and preparing for the market the various products of the soil from the animal and vegetable kingdom.

2. *Chemical processes*, including manufactures and compounds in dyeing, color-making, distilling, manufacture of soap and candles, and all chemical manufactures.

3. *Leather*, including tanning and dressing leather, the manufacture of boots and shoes, saddles and harness, and such other articles as are generally made of leather, with the tools and machines for their manufacture.

4. *Household furniture*, including machines and implements for domestic purposes, as washing machines, bread and cracker machines, feather dressing machines, and out household articles of every description.

5. *Wearing apparel*, articles for the toilet, and instruments and machines for their manufacture.

At the time of opening the books of my division as examiner, I received as my share of the cases then on hand in the office 230. Since that time I have received 167 new applications. But previous to the above distribution, I received and acted upon 11 other cases which have not been included in my monthly reports. These were all completed actions. Three of them were ordered to issue, and eight were rejected. Five other cases not included in my monthly reports, were also acted on by me previous to opening my separate books; these are still pending.

Of the 397 cases received by me at the time, and since the distribution, 80 were patented and 98 rejected; 46 are still pending, and 168 still unacted on.

The following tabular view will show the history and present condition of the work done, and to be done, at my desk.

	Before distribution.	Distribution on 22d Aug.	September.	Octob	November.	December.	Total.
		Aug.					
Number of cases received	16	230–27	36	44	34	26	413
Examined	16	27	56	38	45	58	240
Issued	3	4	18	20	17	21	83
Rejected	8	6	27	19	17	29	106
Pending	5	......	....	....	....	46	51
Not yet acted on	..	230	210	212	200	168	168

Agriculture.—Under this head have been patented 33 applications, and rejected 48.

Agriculture constitutes one of the largest classes in the office.

Up to the 22d of August, this, with all the other classes now in my charge, was in the hands of Dr. Page, and will be reported on by him. There will be, therefore, an apparent incongruity in the reports of the present year, from the fact that some applications in each class of inventions distributed to the newly appointed examiners will be found in the reports of at least two examiners. Of the patents granted under agriculture, seven were for modifications of the single plough; one for a combined plough; one for a double plough; two for hill side ploughs; five for cultivators; six for seed planters; one for a bog cutter; five for grain and grass cutters; three for horse rakes, and two for corn shellers.

The character of the inventions is somewhat local, adapting itself in each case to the wants of a section of the country only. The cultivation of the river bottoms and prairie lands of the west and southwest presents wants different from those of the rough and rocky soils of the New England States; and machines and implements well adapted to the former would be totally unfit for the latter. In this country, and especially in the newer parts, when compared with the older European States, labor is more expensive, land cheaper, and animal power easily obtained and supported. The desideratum, therefore, seems to be labor saving machines worked by animal power, adapted more especially to bottom lands and prairies. Hence, we find the scythe and the sickle, the hoe, the rake, and the flail, of the New England hills, giving place to the seed planter and the harvester, the threshing machine and the cultivator of the western plains.

The plough, which, previous to 1848, had been so varied in its construction as to form the basis of claims for between three and four hundred American patents, still continues to present slight modifications. But of the eleven applications patented during the year most are for minor points of invention. One of the most interesting of this class of implements is the combined plough, remarkable for its number of adjustments for the various purposes of ploughing and cultivating the soil. The instrument is susceptible of change from a combined plough into a cultivator, and with devices for several changes even as a cultivator. As a combined plough, it consists of a frame work of wood for supporting the standards for the changeable reversible shares or teeth, the outline of which is of a rhomboidal shape; the bottom edges of which shares are horizontal, and the forward points of which are turned to the right or left, inward or outward, according to the direction in which the soil is to be thrown. A vertical cross section through the share gives the form of the letter S, so that, when running in one direction, it scrapes the soil up, and when reversed back side before, its operation is to smooth it down, answering the purpose of a roller, such as used for covering planted grain. The share part has an upside down adjustment to fasten it to the standard, so that when the bottom is worn out, the share part may be inverted, and used again for the same length of time. If used as a gang plough, it has an adjustable land side to be attached to each share, so as to guide the plough and prevent it from running to the right

or left, as it might otherwise do. When the instrument is to be used as a cultivator for pulverizing the soil, the landsides being removed, the teeth or shares may be set, some inclining inward and some outward, so that the forward teeth may throw the dirt inward, for example, and the rear teeth throw it outward. When the teeth have been set to work as a cultivator, and it is required to use the instrument as a roller, or as a substitute for the harrow, for covering in or pressing down the grain, the tongue is reversed, and the instrument becomes a substitute for the roller. Although this instrument possesses a great variety of changes and adjustments, only a limited claim could be granted for it.

A minor improvement has been added to the plough for ploughing among corn, which consists of a common plough having a cross beam fastened near the forward end of the beam, and two cultivator teeth projecting downward from the ends of the cross beam, for the purpose of tearing up and loosening the soil. Between this cross beam and the plough, and partly over the anterior part of the mould board, and in a direction oblique to the line of the furrow, there is arranged a strip of wood or metal called a guard, the object of which is to prevent the large masses of earth thrown up by the plough from falling upon the young plants. This *furrow guard* is so elevated as to be above the ordinary level of a small furrow, and its chief merit seems to consist in its adaptation to ploughing among corn while the plants are so small as to be liable to be covered up by the ordinary plough, when used without such protection.

Cultivators.—Five patents have been granted for cultivators; but no prominent new feature or combination of features has been presented, if we except, perhaps, a single case, in which a kind of crank axle is so arranged as to elevate and depress the teeth of the instrument to any given depth in the soil. For the accomplishment of this purpose, at each side of the cultivator frame the axletree is bent twice at right angles, forming a crank on each side of the frame, and between it and the wheels. By the semi-rotation or vibration of the said crank axle, by means of a lever over the frame moving in a vertical arc and alongside of a disk piece of metal provided with holes and pin, the teeth of the cultivator are set to any depth in the ground by turning the lever, or when not required to cultivate, as in returning from, or going to, the field, the teeth are raised quite above the ground.

Seed planters.—Six instruments of this description have been patented in my division.

These are all for minor points of improvement. One contains a kind of skeleton frame going immediately before the seed dropping apparatus to prevent clods from falling upon the planted grain, but to allow the fine dirt to pass through.

Another has a device for striking a bell at each deposit of the seed in the hill.

Another still accomplishes the same purpose and gives the signal of the time of dropping the grain by the rotation of a hand or

pointer over the figures on a dial plate, which figures correspond to the holes through which the grain is dropped.

Harvesting Machines.—Five instruments arranged under this head have been patented; some designed to cut grain only, others to cut grain and grass, and others to cut, collect, and deposit in bundles or bunches ready for binding the cut grain.

One of these machines possesses two somewhat novel devices as applied to such purposes. The first is designed to give horizontal movement across a platform with a rotary rake, so as to take the grain cut by the sickles or any other cutters to the back part of the platform for the purpose of binding it.

This device will be readily understood by supposing a rotating rake suspended horizontally over the middle part of the platform of an ordinary reaping machine, and so arranged as, while the machine is moving forward, the rake by rotation first sweeps the standing grain against the cutters, and when severed by them, it is still carried backward to the rear of the platform where it is delivered ready to be bound in bundles.

To give the rake a horizontal motion from the front to the rear of the platform, it is necessary that the rake head, which is attached by pendant arms to the rotating axle, should be somewhat elevated in the central part of its sweep across the platform. To accomplish this elevation the pendent arms are made to slide in the axle just sufficient to allow of the required elevation, and on each end of the rake head is fitted a wooden roller, which runs on a horizontal guide rail, by means of which the teeth are kept just above the platform and have a horizontal movement. To secure a rapid motion in the rake head in the first part of its sweep and drive the tops of the grain against the cutters, and to diminish the said movement near the end of the sweep, and thus avoid throwing the grain too far over the platform, it was necessary that the gearing should be so arranged as to accomplish both under one.

The device for this purpose consists of two eccentric pinions, one an ellipse on the rotating axle of the rake, and the other circular, a little smaller, with its axle a little on one side of the centre, so that the cogs of its longest radius shall mesh into those of the shortest in the elliptic pinion. By this arrangement is secured an alternate slow and rapid movement twice in the complete revolution of the rake.

Horse rakes.—Three patents have been granted, only one of which claims special notice. The improvement in this machine consists in the device for the independent movement of each tooth; so that, if the rake should meet with obstructions, so many of the teeth only as are involved in the obstruction would be elevated and ride over it, while the rest would retain their position upon the ground.

The design of this rake is executed by so constructing it that each rake tooth has a handle or arm of suitable length, through the end of which a hole is bored horizontally, and through the hole a rod of proper size and strength is thrust.

To set up a horse rake of the desired dimensions, a light pair of

wheels and axletree are provided, and a sufficient number of the rake teeth and handles are strung upon the rod above-named, which rod is placed horizontally over the axletree and acts as a hinge joint to all the rakes, the teeth of which rest on the ground behind the wheels.

The use and application of this machine in rough and irregular ground is obvious to all who inspect it.

Corn shellers.—Only two patents have been granted under this head.

Corn shellers have usually been constructed in one of three modes: in the first, the shelling is performed on the periphery of a cylinder; in the second, it is done on the sides (one or both) of a wheel; and in the third, it is done by forcing by means of a mallet or hammer the cob surrounded by the corn through a hole sufficiently large to admit the cob only.

The sides of this hole are called the strippers, and are often arranged in radial sectional pieces of four, six, or eight, each acting concentrically against the corn or cob by the force of a spring or some substitute behind.

To this last kind of corn shellers there have been raised several objections, the most prominent of which is, that in the opening of the radial sections by stripping the corn from the cob the kernels often become entangled and wedged between the radial sections, and prevent some one or more of the sectional pieces from acting upon the rows of corn to which it may be opposite.

To obviate this difficulty is the design of one of the patents now granted. The device consists in so arranging four strips of metal in the form of the cross and acting concentrically, that where the strips meet around the hole they shall so overlap each other as to prevent the occurrence of any space between them for the lodgement of corn. Each strip is, as usual, pressed against the corn by a spring on the periphery of the disk or table.

Bog cutters.—Only one instrument of this kind has been patented in my division. The device claimed is for a minor improvement.

Chemistry.—Under this head 14 applications have been patented and 24 rejected.

Although no great discovery has characterized this branch of science during the past year, yet several of the improvements herein contained involve matters of considerable interest in the arts, and indicate the onward progress of knowledge.

The applications in this class that have been patented are distributed throughout a large range of the arts. Rotting of hemp, manufacture of alkaline chromates, slate pencils, Indian rubber, buckwheat sizing, vinegar, fish glue, flux for reducing ores, and a metallic alloy, are the principal subjects.

Hemp rotting apparatus.—The increasing demand of this article for many years has led to various devices for rotting and otherwise preparing it for the market.

Several devices have been patented in former years for processes of rotting the hemp, some claiming the temperature alone, some

claiming the use of warm water, others water from the temperature of 60° to 120°.

The subject of the present patent is an apparatus the design of which is both to shorten the process and diminish the expense of the manufacture by heating, rotting, and drying, by a single fire, and by arranging the rotting and drying apartments side by side, so that the hemp as soon as rotted can be moved forward to the drying room, where the process is finished and the article prepared for the break. For the accomplishment of this purpose, a suitable fire grate, surrounded with a coil of hot air pipe, is set upon one side of the rotting room, and the drying room on the other side—the three being in a line.

The hot air pipe commences at the furnace and leads off horizontally through the lower portion of the rotting room and terminates in the lower part of the drying room, where the heated air is discharged, and where ascending through the loosely packed hemp in a gentle current carries off the moisture rapidly, and soon dries the article, and thus renders it fit for breaking.

The rotting room is made to perform its part of the process as follows:

The lower portion through which the hot air pipes pass is made water tight and supplied with water, which is heated by the pipes to the desired temperature for promoting the fermenting process. The hemp is placed upon a grating a little above the vats, where the moist air and steam together act upon it, hastening the decomposition of the nitrogen compounds.

To regulate the temperature and keep it within the limits required, a small, vertically placed iron cylinder, open at top, is set on the grating in the middle of the rotting room, with a piston rising upwards, and so connected with the damper of the furnace and stop cocks of the hot air pipes, by means of levers and cords, as to control the combustion and the amount of hot air delivered through the pipes, and keep the vat at a uniform temperature. A bellows or fan blower is used to keep up a sufficient supply of hot air from the furnace.

Manufacture of Alkaline Chromates—that is, the chromates of potash and soda, by exposing the sulphates and muriates of those alkalies, respectively, with what is called chrome ore, (a mixture of the oxide of chrome and the oxide of iron,) at a red heat, in an atmosphere of air and steam, by which process the oxide of chrome receives additional oxygen, converting it to chromic acid, and which then by its superior affinity unites with the alkaline base and forms a chromate of potash or chromate of soda, according to the kind of salt used.

To render this subject perfectly plain and intelligible, it is necessary to refer to a discovery made by the same gentleman, and noticed in the report of 1847.

It was there referred to as the discovery of an American citizen, then residing in England.

The discovery alluded to is the power of steam in a current to take up and carry away the acids of certain salts when brought

into contact with them at a strong red heat, as in passing over them, or in forcing its way through them.

Thus, if a current of steam be forced through fragments of plaster of Paris, (sulphate of lime,) at a heat just below that at which the material would melt down, the acid will be decomposed, and the sulphurous acid might be condensed and converted again to sulphuric acid, as in the ordinary sulphuric acid chamber.

Again, if a muriate—as the muriate of potash, or of soda—is to be decomposed, it is heated so as to be converted to vapor, and while in this state, and mingled with steam at the same temperature, it is forced through a cylinder filled with fragments of alumina, also at a high red heat—when the acid escapes through the mass, and the alkali, whether it be potash or soda, combines with the alumina and may be easily separated. Thus the play of affinities is modified in almost every compound submitted to the agency of steam at a high heat.

The case under consideration in the present report is one in which a new play of affinity is introduced, and a new process of manufacture, by the agency of steam brought into contact with the materials at a high temperature.

In the common method of the manufacture of alkaline chromates, especially chromates of potash, which are generally used, the process consists in first roasting the chrome ore with nitre in a reverberatory furnace, by which the oxygen of the nitric acid is transferred to the oxide of chrome, converting it to chromic acid, which acid immediately unites with the potash, forming the chromate of potash.

In the new process claimed steam is brought in as an element of the process; and the oxygen required to convert the chromic oxide into chromic acid is obtained from the atmosphere, instead of the nitre used in the old process.

The inventor is enabled in his process to dispense with the nitre, an expensive salt, and substitute a cheap material, such as the muriate or sulphate of potash, in the manufacture.

The process is deemed so important to the arts, and the specification presented in language so concise, that I give the principal part of it in the words of the inventor:

"My invention consists in using as the source of the alkali in the manufacture of the chromates certain salts, which contain it in combination with an acid so powerful as not to be destroyed by heat, but which, by the use of certain substances to combine with or carry off their acids, will leave the alkali free to unite with the chromic acid produced from the chrome ore.

"The salts which I employ are the sulphates and muriates of potash and of soda, the silicate of potash, and the sulphates and muriates of baryta and strontia. The substances I use to combine with and carry off the respective acids of the several salts, are steam and lime in the case of the sulphates and muriates of potash and soda, lime in the case of the silicate of potash, and steam in that of the sulphates and muriates of baryta and strontia.

When the sulphate or muriate of potash or of soda is to be used, I mix intimately one part, by weight, of chrome ore with two parts of the sulphate or muriate and two parts of lime, all in fine powder, and expose the mixture to a red heat for eighteen or twenty hours on the hearth of a reverberatory furnace, while currents of heated steam are thrown upon its surface from pipes coming through the roof of the furnace. The atmosphere in the furnace must be always kept in an oxidizing state by the admission of a sufficient quantity of air through openings above the level of the fuel, and the charge should be frequently stirred to expose fresh surfaces to the steam and air. The lime is not absolutely required in the above mixture, as the chromate will be produced by the action, at a high temperature, of steam upon a mixture of chrome ore and the sulphate or muriate of potash, or of soda alone; but I prefer to add the lime, as it aids the action by combining with the impurities of the ore, and also renders the charge more porous. It is already known that a chromate can be produced by heating together chrome ore, sulphate of potash or of soda, and lime, without the use of steam; in which case the sulphuric acid of the sulphate forms a combination with the lime, which is troublesome in the subsequent extraction of the soluble chromate; but when steam is employed as above described this acid is volatilized and carried off during the calcination. When the charge is found by the usual tests to contain a sufficient quantity of the alkaline chromate it is withdrawn, and the soluble part extracted by water in the usual way. When the muriates of potash and of soda are employed, as they are volatile, at high heat, a portion of them will be carried off with the gases of the fire. When it is desired to avoid loss from this source, the product of combustion should be passed through suitable condensers before escaping into the atmosphere. To obtain chromate from the silicate of potash I use the native double silicate of potash and alumina, or common potash feldspar, and I prefer that which contains the largest proportion of potash. One part, by weight, of chrome ore is intimately mixed with four parts of feldspar and four of lime, or an equivalent quantity of the carbonate of lime, all in fine powder. The mixture is spread on the hearth of a reverberatory furnace and kept at a bright red heat for eighteen or twenty hours, and stirred frequently, so that all parts may be equally exposed to heat and air. An oxidizing atmosphere is preserved by the admission of sufficient air into the furnace. The heat should not be permitted to rise high enough to cause even incipient fusion in the charge, which should be kept in a porous state. When an examination of the charge in the usual manner shows that it contains the proper quantity of alkaline chromate it is withdrawn from the furnace and lixiviated with water, as in the common process.

"When I can procure a limestone sufficiently plastic to make a ball of the mixture hard enough to stand burning in a kiln, without crushing and choking the draught, I prefer that mode of calcination as more economical. For this purpose I use a kiln of separate

lateral fires, so that the fuel is kept from touching the charge and yet the products of combustion pass through it.

"The materials made up with water into balls of three or four inches in diameter, and dried, are placed in the body of the kiln and withdrawn from below when sufficiently fired; as in the reverberatory furnace, care must be taken to preserve an oxidizing atmosphere, and to prevent the charge from fusing by too high a heat. To obtain the chromates of baryta and strontia from the sulphates and muriates of those bases, I mix the chrome ore with double its weight of the sulphate or muriate, all in fine powder, and expose them on the hearth of a reverberatory furnace to a high heat and a current of steam, as before described for the sulphate of potash. A high red heat will be found advantageous in treating the salts of baryta and strontia. The chromate of baryta or of strontia thus produced will be mixed with the residual undecomposed ore and sulphate or muriate, and may be used as a source of chromic acid.

I have thus fully described the nature of my said invention, but I do not confine my claim to any particular form of apparatus, or mode of working, or proportion of ingredients; but what I claim is making the chromates of potash and soda, by exposing a mixture of sulphate or muriate of those alkalies, respectively, with chrome ore, either with or without lime, at a red heat, to a current of steam and an oxidizing atmosphere. I do not claim making chromates of potash and of soda by heating together the sulphate of potash or soda, chrome ore and lime, without the use of steam. I also claim making the chromate of potash by heating to redness a mixture of potash feldspar, lime, or its carbonate, and chrome ore, in an oxidizing atmosphere.

I also claim making chromates of baryta and strontia, by exposing a mixture of the sulphates or muriates of those bases, respectively, with chrome ore, at a high heat, to a current of steam and an oxidizing atmosphere.

Composition for slate pencils.—This invention is a valuable improvement on the article in general use for this purpose. It sheds a sufficient amount of the material to give a clear white trace on a slate of the ordinary kind, is sufficiently soft to make its marks with no more sound than accompanies the writing of an ordinary lead pencil upon paper, and is a valuable addition to that branch of the arts. It consists of a mixture of equal parts of pure fine clay or alumina, and of French chalk or pulverized soapstone in combination with water sufficient to make into a stiff mortar or cement, which is forced through apertures of the proper size for slate pencils which are cut into convenient lengths and dried, and subsequently baked in a kiln to the proper degree of hardness. Composition and process claimed.

Elastic India rubber cloth, designed as a substitute for the ordinary shirred India rubber goods.—It is prepared in the following manner: A muslin of cotton, or any other texture, is stretched on a suitable frame in a direction diagonally between that of the warp and woof, so as togive the diamond form to a

square piece of goods. While the cloth is strained on the frame, in the manner stated, India rubber threads or sheets, free from tension and covered on both sides with a cement or solution of India rubber, are laid upon the cloth, also diagonally, but in a direction parallel with the shortest diagonal of the diamond. Having placed the rubber in its position upon the strained texture another piece of muslin of the same form andsize, and stretched in the same direction, is placed over the rubber threads or sheets, so as exactly to cover the lower piece of goods; the whole is now firmly compressed into one fabric, so that the cloth on both sides of the rubber shall touch it in every part, and the cloths shall touch each other at the intervals between the strips of gum or rubber whenever it be laid in strips.

The materials being put together in the manner stated, the cloth in the direction of the rubber strips will be capable of elongation sufficiently for the rubber, in drawing it back to give it all the elasticity required for any purpose whatever. The inventor claims the process of preparing the cloth and placing the rubber obliquely between the thicknesses as described.

New composition in the manufacture of India rubber goods.—The invention consists in the mixing and duly incorporating with the rubber while in the plastic state a given quantity of some salt of zinc, or combination of zinc, as the carbonate, sulphate, or oxide, with sulphur. The inventors prefer the native carbonate (lapis calaminaris) and give the following proportions as the best:

Caoutchouc dissolved, 56 pounds, and gradually add with heat carbonate of zinc, 56 pounds, and flowers of sulphur, 3 pounds 8 ounces. Claims the use of carbonate, and other salts of zinc, with sulphur as described.

Buckwheat sizing for yarns.—Intended as a substitute for the wheat flour size used in the manufacture of cotton goods.

The following is the mode of preparation: Into an open tube, of the capacity of seventy gallons, one hundred pounds of buckwheat meal are put, and forty gallons of water at the temperature of 130° Fahrenheit are added. The room is to be maintained at the temperature of 80° or 90° for seven or eight days, or until the compound is sufficiently fermented. In the meantime the mingled bran and gluten which rise to the surface are to be removed by a scummer; and at the end of the fermentation the clear water is decanted or drawn off by means of a syphon and the glutinous mass is left in the bottom of the vessel.

Sufficient clean water is now to be added to enable the material to pass through a fine wire sieve into another tube, where it is to remain two days for the solid matter to have time to settle to the bottom. Again skim off the impurities and decant the clear water as before. Dissolve eight ounces of supercarbonate of soda in one gallon of water and add the solution to the glutinous mass and mix thoroughly, and transfer the whole to a suitable boiling vessel, adding at the same time sufficient water to make in all 140 gallons. The boiling is recommended to be done in the same manner as that in common use for boiling starch. The contents are

brought to the boiling point as soon as possible, and thoroughly agitated during the operation. The boiling once commenced is continued slowly for about three hours, when the contents are drawn off into tubs holding about seventy gallons each, and when cooled to the temperature of the atmosphere is fit for use.

Claims the composition and process as described.

Material to be used in the warm blue, or pastel vat.—This constitutes a part of the operation of dyeing by indigo. To explain the use of the material which is claimed, it is proper to state that indigo is insoluble in most menstrua, and in order to bring it into a state suitable for its use as a dye, a preliminary process is required. This is effected either by exposing it to the action of bodies having a superior affinity for oxygen as certain metals and metallic oxides; or, secondly, by mixing it with some organic matters containing sugar, mucilage, and other fermentable materials; or, thirdly, by subjecting it to the solvent power of sulphuric acid. In acting on the indigo according to the second process, the fermenting materials generally used are woad, prepared by fermentation or merely dried and bran of wheat.

The inventor proposes to substitute, as the fermenting material, the young shoots of the common carrot and of the parsnip, prepared in the following manner: To prepare a vat, take of the stems and leaves of the common parsnip or carrot, or the young sprouts of the same, 4,480 pounds and pass them through a crushing machine, or otherwise reduce them to a high degree of comminution, and throw them into a heap upon a suitable floor in a warm room and stirring the mass thoroughly once a day by a spade or any other suitable instrument for three weeks or until fermentation has taken place throughout the entire mass. Next add a pint and a half of alkali, (or a pint and a half of a combination of fifteen parts of lime to one of sal ammoniac,) to every two hundred pounds of the material, and thoroughly incorporate it with the mass, and occasionally work it over until the acid fermentation has become neutralized. The compound is then fit for use, but continues to improve by age for some time. The inventor states that he does not always intend to employ the alkali, in the exact proportions named, although they are well adapted when it is desired to shorten the time of preparation of the materials. But he believes that, when a very long time may be allowed to the mass to lie exposed to the air and suitable warmth, the alkali may be dispensed with altogether.

Claims the composition, material, and the process as set forth.

Manufacture of Ichthyocolla or fish glue.—This manufacture is chiefly confined to the eastern parts of Massachusetts and the neighboring coast, and constitutes one of the products of the codfishery; the sounds of this and some other species are made into what is called *ribbon glue*.

The process is as follows: The sounds duly separated from other parts are soaked or moistened with water, and reduced by suitable means, as chopping, and beating to a proper consistence, are run through rollers and drawn out into long ribbons or strips, and sub-

sequently dried for the market. In running this material through the rollers, it is found, where the work is done on a large scale, that both the material and the rollers become heated, and the present invention consists in an ingenious device of hollow rollers so arranged and connected by hollow journals and pipes that a current of cold water is kept circulating through the rollers, having its entrance and exit on the same side of the machine, by which the material is kept cool during the operation of manufacture.

The inventor claims the several devices in combination.

Manufacture and refining of lamp black and of colophane.—The invention claimed is an apparatus for the manufacture of lampblack, of colophane, and for refining lampblack all in one, the main features of which consist in a horizontal cylindrical cast or wrought iron retort, arranged in a furnace with a funnel and feed pipe for the melted rosin at one end, and a corresponding discharge pipe for the gas generated at the other. Immediately under the discharge pipe and through the bottom of the cylinder, there passes out a pipe vertically downwards for the discharge of the unconsumed rosin, called colophane, or colophany, which pipe dips into a reservoir of the same material and prevents the passing out of any gas through the colophane pipe.

The lampblack is prepared by burning the gas issuing from the discharge pipe from several burners placed within the first of a series of vertical flues, supplied with a limited quantity of air. The flues stand side by side, and are so constructed and arranged that the draught ascends the first flue, descends the second, ascends the third, descends the fourth, and, ascending the fifth, passes out at the top of the chimney. Immediately over the row of burners in the first flue is arranged a metallic cylinder, with convenient doors for opening and closing on the outside, which cylinder is designed for refining the product collected from the several flues, by heating it sufficiently to drive off all the volatile matters it may have absorbed during its condensation.

Manufacture of Vinegar.—The chief point in the invention in this case consists in the application of a material in the manufacture of vinegar not hitherto used for such purposes. The substance claimed is the swill grains or the exhausted liquor of distilleries. In all operations conducted in the large way, and especially where there are chemical processes depending on affinity, and that again on slight changes, such as strength of the materials, temperature, and other modifying causes, the chemical changes of one stage of the process are rarely completed before another is commenced; and thus more or less material is necessarily lost in all great manufacturing establishments. Thus in distilleries which to be profitable must be conducted on the large way, the fermentation of the grain, in order to save the largest amount of alcoholic liquid, is disturbed before the process of fermentation is completed, and consequently a portion of sugar, of starch, and of dextrine, are left in the waste liquor or swill after distilling off the alcohol, which if allowed to ferment again by a moderate temperature, will soon run into the acetic fermentation and vinegar will be produced. Hitherto the

swill has been used only for feeding cows and swine; the inventor however, availing himself of the new German, or quick process of making vinegar, has been enabled by devices for separating the solid matters which would otherwise clog the apparatus and impede the process, to convert the swill into a passable vinegar that may be used in the manufacture of white lead, sugar of lead, Paris green, and in other salts called acetates.

The merit of the invention is believed to consist in the several devices for clearing the liquid from the sediment, by means of subsiding vessels, having at different elevations a series of cocks for drawing off the clear liquid, and then filtering it upwards through a suitable filtering material and in a suitable tube for the purpose.

When the material has been run through the filter, it is ready to be subjected to the common operation of manufacturing vinegar from a mixture of whiskey and water, by allowing it to trickle through casks of shavings suitably arranged for the purpose.

Leather, and articles manufactured from it.—11 patents have been granted, and 14 applications rejected.

Of the patents granted in this class, three are for riding saddles, two for harness saddles, two for harness buckles, one for a bridle, one for a boot tree, one for pegging shoes, and one for a boot crimp. With the exception of the last two named, the patents were granted for minor improvements which require no special notice. The boot pegging machine, above referred to, contains several ingenious devices, some of which are believed to be entirely new, and others, though not new in themselves, are new in boot pegging machines. The invention requires some notice; and yet, from the complication of the machine, I can hardly hope to convey an accurate idea of all its parts. In its outline it consists of a rectangular frame; the movements of the parts within are driven by the connexion of a driving pulley at one end of the machine with any suitable power. The boot or shoe, with its sole upwards, is placed horizontally and lengthwise in the central parts of the machine. The devices for the accomplishment of the work, are chiefly four: First, a charger to hold and deliver the pegs one at a time to be driven into the sole; second, the guide tube to receive the pegs from the charger, and enter their points into the sole; third, the awl and punch, one for making the hole and the other for driving home the peg; fourth, the guide movement of the sole to give a new position of the last for each peg that is driven.

The charger consists of a disk of metal with a flat rim, the whole having the appearance of the cover to a common pill box, and having within a spiral strip of metal coiled up like the main spring of a watch, with one end made fast at the centre, and the other at the circumference. The space between the several strips, coiled upon themselves and forming a continuous passage from the centre to the circumference, constitute the reservoir of the charger, which, at the commencement of the operation of pegging a sole, is filled with pegs; and these are delivered as they are required at the circumference, by means of a little metallic finger or pusher, which

starts at the centre, and, following around the spiral channel, drives the pegs before it, so that as fast as one is delivered or handed over to the guide tube another takes its place.

The charger is placed on its edge directly over the sole, and rotates on an axis which runs parallel with the length of the machine.

The construction of the guide tube may be understood by supposing a steel wire, a little larger than the ordinary knitting needle wire, laid across the frame just under the charger, and capable of vibrating or rotating backward and forward a quarter of a circle, and having a horizontal hole through its middle, just large enough to receive a peg split to the exact size. While the hole of the guide tube is horizontal, the pusher of the charger throws forward a peg that enters it, when the guide tube rotates or vibrates a quarter of a circle, and brings the peg with its point downwards vertically over the hole just made for it by the awl in the sole, when the punch comes down from above and drives it home.

The devices for making the holes and driving the pegs, consist in two vertical rods passing through guide slots in a horizontal cross bar, and moving with a vertical motion. One of these rods, sharpened at the point, makes the hole in the leather, and while rising the guide tube presents the peg with its point over the hole, and the other rod with a square face upon its end, comes down upon the peg and drives it home. Both the rods are worked by levers moved by cams on the main or driving shaft.

The device for moving the last or sole, so that every part of its surface may be brought under the awl and punch successively, is the same as that used in machines for turning irregular bodies, in which a pattern on one end of a lever guides the motions of the last or sole on the other end.

A patent has been granted for the combination of devices for crimping boots, in which the combination of the screw and inclined plane with segmental sliding pieces along the back and bottom of the form, enable the operator to strain the leather of the fore part of the boot in a backward and downward direction very forcibly, and yet with comparative ease to himself.

The application of the inclined plane may be understood by supposing the boot form to stand in the natural position of the foot upon the floor, having the back in a piece separate from the front, and the parts in contact between the back and front being inclined planes running from the front backwards and downwards at an angle of 45 degrees, so that by forcing the back piece downward by means of a thumb screw on the top of the back piece, to which is confined on both of its sides the leather to be crimped, the back piece is made to ride out backward and downward on the inclined planes, and thus the leather becomes sufficiently strained to bring the upper of the boot into its proper form. The bottom part of the foot has also the same arrangement of inclined plane, and is connected with the back piece of the leg at the heel by means of a joint, so that when the back piece is thrown downwards and out-

wards, the bottom piece of the foot, to which the upper over the foot and ankle are attached, is also drawn downward and backward. Thus, by merely turning a thumb screw at the top of the form, the whole work of crimping is performed.

The inventor claims the combination of the several devices referred to.

Household Furniture.—Fourteen patents have been granted and twelve rejected.

The subjects of the patents are considerably diversified, embracing refrigerators, window curtain fastening, cracker machines, extension tables, book safes, knife polishers, plaiting machines, sausage stuffers, and smoothing irons; only three or four of which require particular notice.

A cracker machine has been patented having a novel contrivance for clearing the scraps from the cut dough, by means of an extra endless apron which projects under the cutters at the proper time and receives the dough cut and pricked ready for the oven, and by a reverse motion carries it away to be delivered to the baker.

The main or principal endless apron receives the dough from the kneading rollers and carries it forward to the other end of the machine, where the cutters are.

The cutters are of a circular form, and have a novel contrivance within for the purpose of retaining the dough when cut until the extra endless apron, which lies outside of the machine, is thrown forward under the cutters to receive it. The cutters are made of thin cylinders of steel with a cutting edge at the bottom, and having within an air tight piston working with packing, and armed on its bottom with the necessary sharp points for pricking the crackers. The design of the piston's working air tight is that the biscuit or cracker, when cut, should not fall out of the cutter until the extra apron is presented to receive it. This effect is accomplished on the principle of a partial vacuum within, aided by the external atmospheric pressure. The piston being drawn up while the cut dough covers the whole inner space of the cutters, the dough so cut is sustained within the cutter by the pressure of the atmosphere without, until the proper time, when a little pusher comes down upon the cut dough and forces it out upon the extra endless apron before mentioned.

Smoothing Irons.—A patent has been granted to a lady for an improved form of this instrument, on which both sexes so much depend for personal neatness. The merits of the invention consist in so forming the instrument as to present the greatest variety of surfaces that may be required to "iron" articles of wearing apparel, and is, at the same time, easily managed by the operator. Some idea of the shape of this article may be obtained by supposing the metal of which the "iron" is made, while in a plastic state, to be in the form of the hen's egg and lying upon a smooth surface with the smaller end forward. If now another plane surface be brought down upon the egg shaped material, so as to flatten it out to about half its original thickness, but making the posterior part thinner than the anterior, we shall have a form closely resembling the in-

strument referred to. The anterior portion of the instrument, it will be perceived, is considerably heavier than the posterior, with the idea that the greater mass of metal will retain more heat.

The upper part of the handle has also a backward slope, to aid in pushing it forward and prevent unpleasant strain upon the hand and wrist.

Wearing apparel.—Under this head seven applications have been patented, and three rejected.

Among the former we find an instrument for shaping hats, a lock for umbrellas, a device for the manufacture of artificial flowers, a device for a fastening of pantaloons straps, a method of making razor straps, a process of manufacturing hats of gutta percha solution, and a tailor's shears. Of the devices referred to in this class only two require particular notice—one for an umbrella lock, and the other for a process in the manufacture of hats.

Umbrella lock, designed for umbrellas or parasols.—This invention consists in a device to render the umbrella or parasol useless, if borrowed without consent of the owner, by a locking contrivance contained within the handle.

The handle consists of two metallic tubes, one within the other; the inner one of which is turned by means of a key fastened to the end of the handle, which key may be removed by unscrewing, and be carried about the person when not in use. The lower end of the inner tube is closed by a metallic plate, and a small hole is made on one side of said plate, near its circumference, to receive the end of the catch spring which keeps the umbrella closed. By turning the inner tube with the key screwed on the end of the handle, the spring catch is thrown out and the umbrella is locked; or, by turning the key in the opposite direction, the catch is drawn back and permits the umbrella to be opened. The catch spring is covered by a plate on the sliding scale, so that it cannot be pressed from the outside or drawn inwards without the key.

The use of gutta percha in the manufacture of hats.—The spirit of the invention in this case consists in the shortening of the process in the manufacture of hats by substituting the use of one article in the place of three, formerly used.

The usual practice in the manufacture of hats consists in stiffening the body with shell lac, and after it is dry ironing it on the block, and then coating it with a sizing of glue; and after this giving it two coats of seed lac varnish; and when dry the plush of silk, or other material, is put on and the hat finished.

The imperfections of this manufacture are—first, in order to make the hat keep its shape, it must be made heavier than would otherwise be required. Second, free perspiration in the wearer penetrates the substance of the crown and brim, and gives a spotted or greasy appearance. Third, if the hat becomes wet from exposure or accident, the glue size will draw to the surface of the plush and stick the nap fast to the body of the hat, and thus injure its beauty. From both of the last two causes the plush, it is said, becomes separated from the body, and the hat becomes soft and loses its shape.

The process consists in the use of a solution of gutta percha for stiffening the hat body, and the same material is also used for sticking the plush to the body.

Claims the use of the material and the process as described.

Respectfully submitted.

L. D. GALE,
Examiner of Patents.

Hon. Edmund Burke,
Commissioner of Patents.

H.

A SYNOPSIS

OF

THE STATISTICAL HISTORY

OF THE

PATENT OFFICE.

1. Abstract of legislation in relation to patents and the Patent Office from 1790 to 1849.
2. Table exhibiting the financial history of the Patent Office from 1790 to 1849.
3. Table exhibiting the progress of invention in the United States from 1790 to 1849.

No. 1.

Abstract of legislation by Congress in relation to patents and the Patent Office from the commencement of the government to the present time.

The granting of letters patent by the federal government was contemplated from its foundation. The framers of the constitution, convinced of the necessity and justice of protecting the rights of men of genius in the fruits of intellectual labor, introduced into the first article of that instrument a clause granting power to Congress, "to promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries." This clause is the foundation of the copyright laws, and of the present patent system.

The power thus granted was first exercised by Congress in 1790, the third year after the signing of the constitution.

By the law of April 10, 1790, the Secretary of State, the Secretary of War, and the Attorney General, were constituted a board, any two of whom could grant letters patent to "*any person or persons*" who had "invented or discovered any useful arts," &c., or "any improvement therein *not before known or used.*" No restriction was made as to the qualifications of persons to whom patents could be granted; citizens, aliens, and foreigners were placed, in this respect, upon equal terms.

The conformity of the patent to law was to be certified by the Attorney General, and the instrument was to "bear test" by the President of the United States. The record was to be kept in the office of the Secretary of State, and the model and drawing to be deposited there.

The fees required were small; no oath was necessary, and no examination, in the present meaning of that term, as applied to patents, was had.

This law was repealed by the act of February 21, 1793.

The act of February 21, 1793, was more stringent in its requirements than that of 1790. It restricted the granting of patents to citizens of the United States. The Secretary of War was no longer required to act upon applications, that duty being assigned exclusively to the Secretary of State. The patent, as before, was to be certified, as to its conformity to law, by the Attorney General, and to "bear test" by the President. The applicant was required to "swear or affirm" that he believed himself to be "the true inventor or discoverer," and to file his specification, drawings, &c., in the office of the Secretary of State. The right of assignment was given to inventors, a forfeiture imposed for using patented inventions

without leave, and the sum of thirty dollars made the uniform fee in all cases.

An act supplementary to this act was approved June 7, 1794, roviding for the revival of suits under the law of 1790, "which may have been set aside, suspended, or abated by reason of the repeal of the said act."

The law of April 17, 1800, extended the privilege of obtaining patents to aliens "who, at the time of petitioning, shall have resided for two years within the United States," provided such petitioner made oath that the invention had not "been known or used in this or any foreign country." The privilege was also granted by this law to the legal representatives of a deceased inventor.

The act of February 15, 1819, gave to the circuit courts of the United States original cognizance in equity, and at law, in controversies respecting the right to inventions and writings, and provided an appeal to the Supreme Court of the United States "in the same manner and under the same circumstances as is now (then) provided by law in other judgments and decrees of such circuit courts."

By the act of July 3, 1832, provision is made for the renewal, extension, and re-issuing of patents, and the forms of proceeding in these cases prescribed. And in case of the death of the inventor or any assignment made by him of the same patent, the right, in these cases, was vested in his executors, and administrators or assigns.

The privilege of obtaining patents which had been given to aliens by the law of 1790, denied to them by the law of 1793, and restored to them by that of 1800, was still further extended by the act of July 13, 1832. Residence in the United States at the time of making application, and a declaration of intention to become a citizen, were the only conditions required to place an alien on a level with citizens of the country. But the patent was to be void unless the invention were introduced into general use in one year from its date, and if the patentee failed to fulfil his declared intention of becoming a citizen of the United States.

Hitherto the duty of granting letters patent had been assigned to the Secretary of State, either alone or in conjunction with the Secretary of War; and the incidental business connected with them confided to a subordinate clerkship in the State Department. In 1821, the clerk having charge of it received, by courtesy, the title of Superintendent of the Patent Office, and his salary was fixed at fifteen hundred dollars; but the office, by that title, was first recognized by law, and made the object of a special appropriation, in April, 1830. The amount of business connected with patents had vastly increased, and soon demanded more liberal provision for its transaction. By the law of July 4, 1836, the Patent Office was erected into a separate bureau, and the appointment of a Commissioner of Patents provided for. The office, as organized by this law, consisted, in addition to the commissioner, of a chief clerk, an examiner, three subordinate clerks, (one of whom must be a

competent draughtsman,) and a messenger. These officers were required to be sworn, and the commissioner and chief clerk to give bond. A special seal was provided. The patents issued were required to be under the seal of the office, signed by the Secretary of State, and countersigned by the Commissioner of Patents. The details of organization as prescribed by this law are substantially those under which the office is at present conducted.

Perhaps the most important feature of this law is that which relates to the examination to which applications are required to be subjected. Prior to its passage the examinations consisted merely in a comparison of the specification, drawings and model, to ascertain that they agreed together and with the claim made; but the law of 1836 required the examination to enter into the questions of novelty, utility, and priority of invention—a provision which largely added to the labors and responsibility of the office. To facilitate the discharge of these duties, a library was provided for.

Since the enactment of the law of July 4, 1836, other acts have been passed regulating the details of the organization and business of the Patent Office. An additional examiner, and the employment of temporary clerks, were provided for, by the act of March 3, 1837, which also required the commissioner to report annually to Congress. The appointment of two assistant examiners, and the collection of agricultural statistics, were authorized by the law of March 3, 1839. The right to patent designs was granted by the act of August 29, 1842. These laws also define the rights of patentees, prescribe the necessary forms of proceeding in procuring a patent, provide for the adjudication of conflicting claims, and impose penalties for infringements of patent rights.

Notwithstanding the additions thus frequently made to the force of the office, it found itself unable to transact its rapidly increasing business, and obliged to apply to Congress for additional aid. This was granted by the law passed at the last session of Congress, which made provision for two additional examiners, two assistant examiners, and two engrossing clerks.

The officers of the Patent Office, as now constituted, are as follows:

Commissioner,
Chief clerk,
4 examiners,
4 assistant examiners,
Draughtsman,
Machinist,
5 salaried clerks,
4 temporary clerks,
Messenger.

The following persons have been at the head of the Patent Office, from 1821, when the office of superintendent was created, to the present time:

William Thornton,	superintendent,	July 1, 1821.
Thomas P. Jones,	do.	April 12, 1828.
John D. Craig,	do.	
J. C. Picket,	do.	January 31, 1835.
Henry L. Ellsworth,	commissioner,	July 4, 1836.
Edmund Burke,	do.	May 5, 1845.

H—No. 2.

TABLE EXHIBITING THE FINANCIAL HISTORY OF THE PATENT OFFICE FROM 1790 TO 1849.

Statement of the receipts from patent and other fees, and of payments for salaries, and the contingent expenses of the Patent office, (including the erection of the building,) from its establishment to January 1, 1849.

	Receipts.	PAYMENTS. For salaries, recording patents, &c.	For contingencies, books, fixtures, preparing statistical information, &c.	Restoring models, drawings, records, &c.	Withdrawing applications for patents, and repayment of money paid by mistake.	Total.	Balance to the credit of the patent fund January 1, 1849.
Patent fees to December 31, 1828, as per statement rendered to the Secretary of the Treasury Sept. 16, 1829	$157,110 00	$62,654 73	*17,808 10				
For other fees	3,549 37						
In 1829	12,990 00	4,130 55	3,000 00				
1830	16,350 00	4,300 00	4,630 42				
1831	17,280 00	5,388 85	1,890 00				
1832	14,160 00	15,400 00	1,500 00				
1833	17,730 00	6,850 02	2,175 00				
1834	23,160 00	8,857 03	2,175 00				
1835	28,320 00	5,375 13	1,500 00				
To July 4, 1836	17,100 00	2,758 04	2,000 00				
	307,749 37	115,714 35	36,678 52				
Amount to July 4, 1836, constituting the patent fund, per act of March 3, 1837	307,749 37						

Receipts from July 4 to December 31, 1836	14,579 58	5,300 00	2,600 00	....	540 00	8,440 00	
In 1837	28,901 08	13,400 00	7,500 00	17,950 00	3,180 00	42,030 00	
1838	41,490 45	12,500 00	8,100 00	11,337 00	3,020 00	34,957 00	
1839	39,061 95	16,735 00	9,159 22	8,100 00	6,409 99	40,404 21	
1840	38,405 39	18,163 51	2,500 00	6,880 90	7,733 31	35,316 82	
1841	33,938 76	18,764 82	5,312 38	18,019 59	10,753 33	52,850 12	
1842	35,670 96	19,350 00	6,800 00	14,570 00	6,500 00	47,220 00	
To June 30, 1843	16,390 40	9,675 00	3,750 00	3,000 00	3,500 00	19,925 00	
In the year ending June 30, 1844	39,145 19	19,450 00	6,950 00	4,250 00	8,703 28	39,353 28	
In the year ending June 30, 1845	48,472 44	18,824 71	8,297 87	4,680 47	7,995 02	39,798 07	
From June 30 to December 31, 1845	27,278 67	10,443 06	5,599 31	257 68	4,030 00	20,330 05	
In 1846	50,264 16	21,828 58	11,871 83	1,371 31	11,086 99	46,158 71	
1847	63,111 19	23,287 57	10,272 35	310 00	8,008 43	41,878 35	
1848	67,576 69	31,541 70	15,289 91	44 00	12,030 23	58,905 84	
Appropriated out of this fund and paid for the building	....	....	....	....	....	108,000 00	
	852,036 28	239,263 95	104,002 87	90,770 05	93,530 58	635,567 45	216,468 83

* Exclusive of contingent expenses prior to January 1, 1814; the amount of which could not be ascertained, the accounts having been lost when the public buildings were burned in 1814.

H—No. 3.

TABLE EXHIBITING THE PROGRESS OF INVENTION IN THE UNITED STATES FROM 1790 TO 1849.

Table exhibiting a comparative view of the number of patents of each class issued to citizens of the several States from 1790 to 1849; presenting a record of the inventive genius of America during that period.

	Maine.	New Hampshire.	Vermont.	Massachusetts.	Boston.	Rhode Island.	Connecticut.	New York.	New York (city.)	New Jersey.	Pennsylvania.	Philadelphia.	Delaware.	Maryland.	Baltimore.	Virginia.	North Carolina.	South Carolina.	Georgia.
Date of admission into the Union	1820	1789	1791	1789	1789	1790	1789	1789	1789	1789	1789	1789	1789	1789	1789	1789	1789	1789	1789
Population in 1848—(estimated)	61,500	308,000	310,000	875,000		135,000	340,000	2,880,000		425,000	2,220,000		85,000	510,000		1,295,000	780,000	620,000	825,000
INVENTIONS EMBRACED IN EACH CLASS.	Number of patents.																		
I. Agriculture, including instruments and operations	113	44	52	103	8	9	115	565	93	56	272	37	12	84	26	134	30	39	12
II. Metallurgy	22	28	28	275	72	25	139	407	159	47	186	77	4	34	24	28	17	3	6
III. Manufactures of fibrous and textile substances, &c.	23	38	55	366	66	102	160	370	112	61	129	54	6	30	19	28	10	7	10
IV. Chemical processes	13	14	12	127	38	3	56	333	162	36	183	91	2	45	39	42	8	5	5
V. Calorific—stoves, grates, furnaces, &c	34	37	34	229	96	16	107	593	218	30	189	115	1	59	43	17	..	4	1
VI. Steam and gas engines	5	11	3	51	27	11	20	207	105	27	123	79	4	47	41	12	6	8	5
VII. Navigation—maritime implements, &c.	16	7	3	87	41	3	27	204	82	26	89	52	2	38	24	21	..	5	6
VIII. Mathematical, philosophical, and optical instruments	4	3	7	35	15	6	36	66	30	5	31	15	1	11	5	9	2	3	..

IX. Civil engineering and architecture	7	10	4	60	22	9	31	209	86	16	88	29	3	39	31	25	1	4	3
X. Land conveyance—carriages, cars, &c.	13	11	14	68	17	6	48	146	41	21	102	35	10	57	46	9	3	10	1
XI. Hydraulics and pneumatics—water and wind mills, &c.	33	25	19	122	28	8	42	339	105	25	128	50	1	46	35	41	4	6	4
XII. Mechanical power applied to pressing, weighing, &c.	33	8	27	35	15	2	17	123	53	8	31	16	1	14	7	22	8	7	3
XIII. Grinding mills and mill gearing	37	16	17	46	9	6	46	200	48	9	105	18	7	25	20	30	20	9	5
XIV. Lumber and implements for its manufacture, &c.	35	57	25	151	21	5	77	304	65	17	88	33	..	24	11	18	15	3	4
XV. Stone and clay manufactures—pottery, &c.	36	3	8	45	10	..	8	73	20	10	68	23	1	16	14	14	..	4	2
XVI. Leather—tanning, boot making, saddlery, &c.	13	18	17	118	29	4	31	129	37	17	80	37	4	20	7	27	1	1	2
XVII. Household furniture, domestic implements, &c.	36	16	9	84	30	6	65	226	75	10	95	30	3	35	27	31	11	1	..
XVIII. Arts—polite, fine, and ornamental	1	4	8	96	65	8	28	155	121	11	99	78	..	15	14	4	2	2	1
XIX. Fire-arms and implements of war	7	6	4	39	4	2	21	57	29	4	30	19	2	4	4	10	..	2	1
XX. Surgical and dental instruments	5	4	5	26	12	3	12	83	50	7	48	38	..	14	12	6	1	3	3
XXI. Wearing apparel and articles for the toilet	4	3	1	34	8	7	64	76	52	12	44	35	..	13	11	5	..	2	4
XXII. Miscellaneous	4	3	1	24	6	16	43	39	14	25	14	4	7	8	15	1	1	3	..
Total	494	366	353	2221	639	257	1193	4904	1757	480	2222	965	71	678	477	532	140	131	78
Ratio of inventions to population	1 : 124	1 : 841	1 : 878	1 : 394		1 : 525	1 : 285	1 : 465		1 : 885	1 : 999		1 : 1,197	1 : 752		1 : 2,434	1 : 5,571	1 : 4,733	1 : 10,706

H—No. 3—Continued.

	Alabama.	Mississippi.	Louisiana.	Arkansas.	Tennessee.	Kentucky.	Ohio.	Michigan.	Indiana.	Illinois.	Missouri.	Florida.	Texas.	Iowa.	Wisconsin.	District of Columbia.	Foreign.	Total.
Date of admission into the Union	1820	1817	1812	1836	1796	1792	1802	1836	1816	1818	1821	1845	1845	1846	1848			
Population in 1848—(estimated)	716,000	670,000	490,000	200,000	980,000	890,000	1,980,000	420,000	1,000,000	800,000	589,000	80,000	150,000	150,000	250,000	48,000		21,686,000
INVENTIONS EMBRACED IN EACH CLASS.	Number of patents.																	
I. Agriculture, including instruments and operations	7	8	4	..	29	28	146	18	27	22	7	..	..	..	4	14	2	*1,956
II. Metallurgy	4	..	1	..	3	4	41	3	6	4	..	..	..	..	..	15	25	1,355
III. Manufactures of fibrous and textile substances, &c	8	4	4	..	14	32	46	..	4	1	12	..	1	1	..	8	21	1,551
IV. Chemical processes	1	4	17	..	5	16	42	1	4	3	2	1	..	..	..	20	35	1,035
V. Calorific—stoves, grates, furnaces, &c	..	..	2	..	3	6	72	4	4	3	1	..	1	..	..	20	12	1,479
VI. Steam and gas engines	4	..	5	..	8	10	36	2	5	..	8	..	..	..	1	13	26	658
VII. Navigation—maritime implements, &c	2	1	1	..	2	7	14	1	3	1	1	..	..	..	..	27	15	609
VIII. Mathematical, philosophical, and optical instruments	3	..	3	..	..	3	11	1	..	1	1	..	..	..	..	4	4	250
IX. Civil engineering and architecture	5	1	10	..	2	3	15	2	6	9	4	..	..	1	1	16	6	590
X. Land conveyance—carriages, cars, &c	4	..	2	..	1	2	17	..	1	2	..	..	..	..	..	9	6	563
XI. Hydraulics and pneumatics—water and wind mills, &c	4	2	5	..	15	11	59	5	11	6	6	..	..	..	..	11	8	986
XII. Mechanical power applied to pressing, weighing, &c	6	7	7	..	9	6	19	..	6	1	..	..	1	..	1	..	2	404
XIII. Grinding mills and mill gearing	10	2	2	..	15	1	55	2	6	5	..	..	1	..	1	6	3	697

XIV. Lumber and implements for its manufacture, &c...	3	1	3	..	8	8	68	8	15	4	1	..	..	..	..	6	2	950*
XV. Stone and clay manufactures—pottery, &c.........	1	3	4	1	..	4	17	4	..	4	..	..	..	..	..	11	1	335
XVI. Leather—tanning, boot making, saddlery, &c......	2	1	2	..	5	9	34	1	5	1	2	..	..	..	1	5	3	553
XVII. Household furniture, domestic implements, &c.....	3	..	2	..	5	16	44	1	5	1	2	..	..	..	..	11	4	722
XVIII. Arts—polite, fine, and ornamental................	1	..	3	..	..	2	7	2	2	..	..	..	..	..	..	13	10	474
XIX. Fire-arms and implements of war	1	..	1	..	..	4	12	1	2	..	1	..	..	..	..	15	4	230
XX. Surgical and dental instruments....................	1	1	2	..	8	12	7	..	3	..	..	..	..	..	..	..	..	254
XXI. Wearing apparel and articles for the toilet	1	..	..	..	..	2	9	..	1	..	..	..	..	..	..	2	2	284
XXII. Miscellaneous.....................................	..	2	..	..	..	1	4	..	1	1	1	..	..	..	1	1	1	202
Total....................................	71	37	80	1	132	197	775	53	117	69	49	1	4	2	10	227	192	†16,137
Ratio of inventions to population........................	1 : 10,084	1 : 18,108	1 : 6,125	1 : 200,000	1 : 7,424	1 : 4,517	1 : 2,554	1 : 7,924	1 : 8,547	1 : 11,594	1 : 1,220	1 : 80,000	1 : 37,500	1 : 75,000	1 : 25,000	1 : 211		1 : 1,360

* The cities of Boston, New York, Philadelphia, and Baltimore, as given in the table, are excluded from these totals, being embraced in the numbers for their respective States.

† This total does not show the exact number of patents that have been issued; for, in cases where there were joint inventors residing in different States, credit was given to each State; and in a considerable number of cases the official digest does not give the residence of patentees.

I.—*Tabular estimate of the crops for 1848.*

	State or Territory.	Present and estimated population.	Population in 1840.	No. of bushels of wheat.	No. of bushels of barley.	No. of bushels of oats.	No. of bushels of rye.	No. of bushels of buckwheat.	No. of bushels of Indian corn.
1	Maine	501,793	615,000	900,000	290,000	2,000,000	200,000	80,000	3,000,000
2	New Hampshire	284,574	308,000	620,000	132,000	2,500,000	500,000	175,000	2,600,000
3	Massachusetts	737,699	875,000	260,000	175,000	2,300,000	750,000	145,000	3,800,000
4	Rhode Island	108,830	135,000	4,600	55,000	220,000	55,000	5,000	900,000
5	Connecticut	309,978	340,000	130,000	30,000	2,000,000	1,500,000	500,000	3,400,000
6	Vermont	291,948	310,000	680,000	60,000	3,500,000	370,000	350,000	2,500,000
7	New York	2,428,921	2,880,000	15,500,000	4,300,000	28,000,000	4,000,000	3,860,000	17,500,000
8	New Jersey	373,306	425,000	1,200,000	12,000	5,800,000	3,300,000	1,000,000	9,000,000
9	Pennsylvania	1,724,033	2,220,000	15,200,000	155,000	20,000,000	13,500,000	3,800,000	21,000,000
10	Delaware	78,085	85,000	450,000	4,500	700,000	65,000	16,000	3,850,000
11	Maryland	470,019	510,000	5,150,000	3,000	2,200,000	1,200,000	120,000	8,800,000
12	Virginia	1,239,797	1,295,000	12,250,000	94,000	11,000,000	1,800,000	270,000	38,000,000
13	North Carolina	753,419	780,000	2,450,000	4,200	4,000,000	300,000	20,000	26,000,000
14	South Carolina	594,398	620,000	1,400,000	4,800	1,250,000	60,000	....	13,500,000
15	Georgia	691,392	825,000	2,100,000	12,600	1,500,000	80,000	....	27,000,000
16	Alabama	590,756	716,000	1,300,000	7,800	2,000,000	85,000	....	28,000,000
17	Mississippi	375,651	670,000	550,000	2,250	1,500,000	30,000	....	17,000,000
18	Louisiana	352,411	490,000	....	....	....	2,500	....	10,600,000
19	Tennessee	829,210	980,000	9,000,000	6,800	10,500,000	400,000	34,000	76,600,000
20	Kentucky	779,828	890,000	6,500,000	20,000	15,000,000	2,800,000	18,000	65,000,000
21	Ohio	1,519,467	1,980,000	20,000,000	300,000	30,000,000	1,250,000	1,500,000	70,000,000
22	Indiana	685,866	1,000,000	8,500,000	42,000	17,000,000	300,000	110,000	45,000,000
23	Illinois	476,183	800,000	5,400,000	120,000	5,000,000	170,000	130,000	40,000,000
24	Missouri	383,702	589,000	2,000,000	15,000	7,000,000	90,000	30,000	28,000,000
25	Arkansas	97,574	200,000	500,000	1,100	500,000	12,000	....	8,000,000
26	Michigan	212,267	420,000	10,000,000	300,000	6,000,000	100,000	310,000	10,000,000
27	Florida	54,477	80,000	....	....	13,000	....	....	1,250,000
28	Wisconsin	30,945	250,000	1,600,000	35,000	2,500,000	10,000	40,000	1,500,000
29	Iowa	43,112	150,000	1,300,000	40,000	1,500,000	15,000	25,000	3,500,000
30	Texas	....	150,000	1,300,000	....	....	....	....	1,800,000
31	District of Columbia	43,712	48,000	20,000	....	17,000,000	8,000	....	50,000
32	Oregon	....	50,000	100,000	....	....	....	....	1,000,000
		17.063.353	21.686,000	126,364.600	6.222.050	185.500.000	32.952.500	12.538.000	588.150.000

I.—*Tabular estimate of the crops for* 1848—Continued.

	State or Territory.	No. of bushels of potatoes.	No. of tons of hay.	No. of tons of hemp.	No. of pounds of tobacco.	No. of pounds of cotton.	No. of pounds of rice.	No. of pounds of sugar.
1	Maine	9,000,000	1,200,000					
2	New Hampshire	5,000,000	680,000					
3	Massachusetts	4,800,000	750,000		150,000			
4	Rhode Island	800,000	90,000					
5	Connecticut	3,500,000	650,000		825,000			
6	Vermont	8,000,000	1,400,000					
7	New York	27,000,000	4,200,000		36,000			
8	New Jersey	2,100,000	470,000					
9	Pennsylvania	8,200,000	2,000,000		610,000			
10	Delaware	200,000	25,000					
11	Maryland	1,000,000	130,000		23,000,000			
12	Virginia	3,500,000	430,000		45,000,000	2,800,000	3,500	
13	North Carolina	3,200,000	140,000		13,000,000	45,000,000	3,600,000	
14	South Carolina	4,200,000	35,000		33,000	105,000,000	90,000,000	
15	Georgia	2,000,000	28,000		220,000	220,000,000	18,000,000	
16	Alabama	2,500,000	21,000		360,000	165,000,000	350,000	
17	Mississippi	2,600,000	1,000		215,000	245,000,000	1,200,000	
18	Louisiana	1,800,000	30,000			190,000,000	5,000,000	200,000,000
19	Tennessee	3,000,000	50,000	800	36,500,000	36,000,000	12,000	
20	Kentucky	2,200,000	140,000	11,000	68,000,000	2,200,000	25,000	
21	Ohio	5,000,000	1,600,000	500	9,500,000			
22	Indiana	2,500,000	500,000	480	3,950,000			
23	Illinois	2,300,000	450,000	550	1,340,000		9,000	
24	Missouri	1,200,000	100,000	7,000	15,600,000			
25	Arkansas	800,000	1,500		220,000	25,000,000		
26	Michigan	5,000,000	400,000					
27	Florida	500,000	1,500		350,000	18,000,000	1,000,000	
28	Wisconsin	1,250,000	150,000					
29	Iowa	1,000,000	60,000					
30	Texas	300,000				12,000,000		
31	District of Columbia	25,000	2,000					
32	Oregon							
		114,475,000	15,735,000	20,330	218,909,000	1,066,000,000	119,199,500	200,000,000

REMARKS ON THE TABULAR ESTIMATE.

In presenting again the estimates of the principal crops of our country, and before entering upon the history of their progress, there are some general remarks which claim our attention. Heretofore, for the sake of comparison, uniformity of arrangement has been attempted. This course, while it possesses its advantages, is likewise attended with some serious defects, and it is believed that a modification of the former method may be useful. It is proposed therefore, now to adopt a plan which, though in the main agreeing with that of the previous reports, may still possess certain new features.

A right conception of the object in view is important at the outset, and a few remarks on this point are the more so, as it would seem very mistaken views have been entertained by individuals on this subject. The old maxim is a good one, that "none can compass more than they intend," and for want of observing this in their judgments, or rather from a want of clearly apprehending the design by which the mind has been led, undeserved censures have been put forth on the result of these labors, that a more accurate discrimination would, no doubt, have spared. There are two principal objects which an agricultural report should aim at—the accumulation and suitable arrangements of facts, and the illustration of their true bearing on the prosperity of our country. In the prosecution of such a design, it is important to notice the progress of the principal crops, improvements in cultivation, and to furnish an abstract of the most useful and interesting facts, relating to the science and practice of agriculture. In other words, an agricultural report should embody a yearly summary of the condition of the staple crops and their cultivation, and of collateral branches of agricultural industry in our own country, together with a condensed view, so far as practicable, of the chief advances made in the science and practice of agriculture in foreign lands.

Agriculture, by the ablest writers on the subject, is now made to embrace not merely the actual practice or tillage of the soil, but it comprises the doctrine of the nutrition of plants, the raising of stock of all kinds, the mutual relations of this branch of industry to others, as developing the wealth there is in the soil, and the applied care and labor by which its fertility is brought out and directed to the welfare of mankind. It is in this extensive sense the agricultural report which emanates from the Patent Office, where are centred the records of the various improvements in the sciences and arts, should be attempted. While it should lay hold of every real acquisition at command which science gathers from its wide field to proffer to the husbandman, and, as far as possible, place it within its reach, it should likewise reap a rich and varied harvest from the experience and treasured facts of practical men of good judgment in every part of our land. Hints and suggestions, or more enlarged description of methods of tillage and their re-

sults; the opinions and arguments of those observers, within their own limited sphere, whose good sense entitle them to be heard, and who yet otherwise might never favor the public with their views, may most appropriately find a place in the pages of such a document. It is by comparison that truth is elicited. The Baconian mode of induction of facts is one of great importance in a subject so closely affecting, as does agriculture, the lives, health and prosperity of a nation. The question of the influence of the great staple products of our country on the world, is one which would admit of most interesting development; and it is one, too, which might not undeservedly command the attention of the ablest of our legislators and statesmen. It would be easy to refer to many an example by way of illustration. To instance, however, but a single one—Ireland—who can fail to see how closely interwoven with her agricultural position is her political one, and the bearings of her crops on the present and future state of her civil and moral freedom.

No amelioration can ever be permanent which does not reach her agricultural development. If the potato crop is continually diseased, and yet is successively relied on for support, it is not a free parliament or any modification of laws and political relations which can save her people from famine and want. Of course, it is not meant here to assert that the sole or chief evil lies in that cause, and that a change of agriculture alone would be a sufficient remedy, but that its influence is one which is great and ought to be regarded. It is a wise foresight which acquaints one's self with his own resources; and the truth is equally applicable to nations as to individuals. He has been said to be a public benefactor who makes two blades of grass grow where but one grew before; and especially is this the case if he not only effects such a result, but if, at the same time, superadds increased and more valuable nutriment to both the products of the former blade, as well as of the new one. He who can plant a new germinating principle, and train forth one new shoot of kindly feeling between citizens of the same country, deserves a still higher meed of praise. It is not, it is believed, claiming too much to say that the tendency and operation of the labors and co-operation demanded and encouraged in this annual summary of results in agricultural industry is of this salutary kind. From the review, year after year, of a correspondence conducted with every section of our common country, and from the expression of feelings indicated by the agriculturists with whose minds we are brought into contact, the conviction has deepened that the placing thus in juxtaposition the recorded results of the operations in this peaceful and invigorating pursuit of life, which have been collected from every section of our land, is exciting no contemptible influence to bind them together in one united aim—the general weal.

The agricultural element is one of vast importance to our country. This, indeed, is beginning to be more and more realized with each successive year; not only the great numbers, the large proportion of the agricultural class of the community, render it so, but also the

diversified relations and bearings sustained by those who compose it, and the products of their industry to our general prosperity as a nation. Subtract from our resources our agricultural productions, and we at once see what a wide void is made. The true question, then, is, what will best promote our prosperity as an agricultural nation? Without mixing up our thoughts with the different theories which are advocated in their great political bearings, there can be no doubt that the highest development of our resources in the products of the land is the great desideratum.

So far as science, gathered from other fields and brought home to the knowledge and every day use of our farmers and planters, can do it, this means should be used. So far as inquiry into the condition or amount of the various articles which come into the aggregate can aid in the object, this too is worthy of careful attention. Industry, collaterally interwoven with the direct topics of such investigations, may likewise claim to be regarded. The great difficulty in all these efforts, however, is the want of accuracy—the neglect of precision on their part on whom we must rely for information. It can scarcely be imagined what an influence this exerts in these matters.

To hazard an expectation that such a result can be secured, except in a long course of years, if ever, would be a most idle phantasm. Few have the analytic power, perhaps, to undertake, certainly not to devise, the processes of its execution; yet by persevering and patient study, advances may gradually be made, and means may be prepared and methods invented, by which vast accessions to our knowledge on these topics may be secured. The people may thus be trained to observe and judge, not by a first conjecture, but with some reference to the elements that should have their proper weight. A system of closer approximation may be introduced, and by its aid materials may be gathered, which, when condensed and set out in their appropriate bearings, will indicate the great results sought.

It were well worth the attention of legislators in all the States, to provide the means for so noble an object. Under regulations fitted to accomplish it, every State in our Union might thus, at a moderate expense, become possessed of the knowledge of its own resources, intrinsically and comparatively, which it could use both to direct its own measures and to exchange for similar information from the sister States and foreign countries.

If the question were asked, what is it that is now giving these United States an increasing importance in the view of the nations of the earth? the answer is ready: It is the increasing knowledge these nations are gaining of the elements of our prosperity and the use we are making of them; they are becoming better acquainted with us. How evident, then, the vast bearing of all collected facts relating to our resources on the influence of this country try abroad. Let the immense extent, the variety and quality of our resources, the elements of our industry, the channels furnished for our future development, all be laid open, spread out before the world, not in the spirit of self-glorying, but in the sober statement

of facts and reasonings on facts, and leave them to find their way to the minds and hearts of our fellow men in every clime. Let them stand forth, if they may, to invite investigation to prove that whatever be the risings of passion or the gush and outbreak of excited party feeling, we are mutually dependent, intertwined, and embraced, every State with its sisterhood; and that with a wise foresight of our relations to each other, our motto, "E Pluribus Unum," was rightly chosen, and must ever be the watchword borne by our national eagle.

> "Long be our fathers' temple ours,
> Woe to the hand by which it falls;"
> Departed spirits "watch its towers,"
> While living patriots "guard its walls."

It may not be improper to glance back over the various labors and products of efforts connected with these reports, and, without assuming to judge from our own convictions, to state certain facts, and leave to others to estimate the value of the results.

In the course of seven years or more of these labors by this office, there have been issued from the press some 250 to 300,000 volumes of reports. Now if it should be allowed that no more than one-half of the whole had found their way to the people, yet, as these could scarcely have been perused in part or whole by less than 1,000,000 of readers, it cannot but be supposed that a very considerable influence has been exerted in this way on the industrial classes of the nation. The calls for the reports, and the gratification expressed at obtaining them, show that they are prized by the farmers and planters of our country. It would be in our power to produce testimonies from many of the most intelligent among these classes in proof of this assertion. In the interior of some of the States it is a known fact that has fallen under the observation of the office, that its reports have been loaned and read till literally almost thumbed out.

Admit, then, that the expense of collecting materials and printing this document may have been equal on an average to 40 cents per copy, the whole would be some $300,000 in the course of say seven years, or about $40,000 per year. This estimate is placed at the very highest, and beyond all doubt far higher than the actual cost. Taking it, however, at its full extent, and can it be deemed a waste of money? No political or party bias, no sinister ends to be answered, can be charged on such an attempt to diffuse useful information. All political parties, all sections, have lent their voice in its favor, and the more so just in proportion as there has been reason to believe they have been brought within the reach of its benefits. If from any cause they have not shared in the distribution, the office, nor the national legislature, are chargeable with the fault. The information has been collected and embodied; it has been in compliance with the order spread upon the pages of Congressional documents for the use of our fellow citizens. Thousands of copies have been sent forth by this office, and by members of both branches of Congress. Copious extracts from the most useful and interesting portions have been transferred to

the agricultural and other public journals, and have been read; many of the suggestions embodied in these documents have been practised upon, and who that knows anything of the influence of knowledge communicated on the minds and actions of a community, can doubt that the effect has been great?

Different persons will estimate this influence, whether salutary or not, according to the view from which they contemplate it. We shall content ourselves with citing only a few testimonies from persons who, both from their position as recipients of the opinions of numbers suitable to form a judgment, and also as the collectors and dispensers of various information, may be supposed to be fully competent to know, as they have, too, the candor to acknowledge, the beneficial effect of these labors.

The editor of the New York Agriculturist speaks of the report for 1847 as "a very elaborate Congressional document, of some 600 pages, illustrated by several wood cuts and steel engravings. This report, we are happy to state, in our humble judgment, has been got up with more care, more ability, and has more intrinsic merit, than any other document of the kind that has preceded it. In addition to the sub-reports of the examiners of patents, which relate to matters appertaining only to the Patent Office proper, the volume contains a vast amount of agricultural knowledge, both practical and theoretical, as well as statistical, that reflects much credit upon the industrious and talented gentleman at the head of this department, and upon those who have so ably contributed to his aid."

The Cultivator, published at Albany, says: "The report for the last year is a document which reflects credit on the Commissioner of Patents, and the individuals from whom the valuable materials of which it is composed were obtained. It forms a volume of 661 pages, comprising a greater amount of useful information than any previous report from this department. In addition to much statistical intelligence of a general nature, in regard to the products and trade of the country, there are several original papers, on various subjects, drawn up with care and labor."

The Congregational Journal, printed at Concord, New Hampshire, speaks of the report as "of great interest;" and that "great industry and intelligence have been shown in collecting the materials, and good taste and judgment in arranging them."

The Niles Reporter, Michigan, calls it "a truly valuable report."

The Cincinnati Enquirer states, that "it contains a mass of valuable statistical information, well arranged."

The Boston Post says: "As a book of reference, to be kept in all public and agricultural libraries, its value must be undoubted." "How such a mass of facts, of science, and observation, could have been gathered in less than a year, amid the multifarious duties of the Patent Office, is hard to conceive."

In the Washington News is the following commendation: "It contains a mass of information which cannot be too highly estimated by all who feel interested in the prosperity and progress of our own great country." "Condensation characterizes its pages; at

the same time the subjects are given with a sufficient comprehensiveness to answer all the purposes of instruction and ability."

The American Farmer, a long established agricultural paper, published at Baltimore, says: "Besides the usual quantity of matter connected with the Patent Office, it contains many valuable articles upon the subject of agriculture, and comprises a mass of agricultural statistics of great interest to the country at large, demonstrating as they do its immense productive resources. The commissioner will accept our thanks for his very acceptable present; and without intending to flatter, we may be permitted to remark that he deserves the acknowledgments of the American husbandmen as well for the matter as for the skillful arrangement of his book."

The Genessee Farmer, also edited by an able scientific agriculturist, gives as his opinion, that the "volume reflects credit upon the commissioner and other officers of the department from which it emanates, and is in many respects superior to any preceding report. It embodies a vast amount of statistical information relative to the trade and products of the country, together with several original papers of great value. The report has evidently been prepared with much care and labor, and a regard to accuracy. The agricultural intelligence, and statistical information, &c., embraced in its pages, will render the work interesting and valuable."

The Ohio Cultivator thus speaks of the report: "From a perusal of most of its contents, we are persuaded it will be found a work of great interest and value to the agriculturist, and especially to writers on agriculture and the kindred arts. It gives a concise and valuable summary of the condition and progress of agriculture in the several States of the Union, with estimates of the crops, population, &c. It also contains a number of essays on important subjects which contain valuable information, and will doubtless be widely republished. As a whole, the volume does great credit to the able Commissioner of the Patent Office, and also to Mr. E. Goodrich Smith, who has the principal charge of the agricultural and statistical department, and for whose fitness for the station this report affords conclusive evidence."

Similar notices were contained in the Prairie Farmer, and other agricultural papers, as well as the most prominent public journals of both political parties, but they have been unfortunately mislaid, and cannot now be inserted. We may also refer to the expressions in its favor contained in many of the replies to the circular of the office, some of which will be found in appendix No. 3, besides the virtual testimony furnished in the willingness to co-operate in the object, thus shown. We have deemed the above citations and remarks a proper reply to the attempts which have been made by some studiously to disparage the labors of this branch of the office, and consider it justifiable to have presented thus much in our own vindication. We might, had we chosen, have said even more.

A *second* topic which may claim some notice in this connexion, is the annual distribution of seeds. It is impossible to say how many thousand packages have been distributed in the course of the

last seven years, as no precise account has been kept; but probably, were it to be put at more than 250,000, it would fall below the truth. These, too, are all included in the previous estimate of expense, as they were purchased with a fraction of each annual appropriation. Should it be admitted that not more than one-half, or scarcely one-third even, of those seeds vegetated, yet 100,000 packages of seeds, many of them choice selections, and scattered in every part of the land, could not but produce some favorable results. The fact that it has been so has been adverted to in the case of certain kinds introduced and approved, and the progress of which has been noticed in the former reports of this office.

For the want of sufficient care in the cultivation, others may have been lost; but this again is not chargeable as a fault of the office. Many species or varieties might be enumerated which have thus been distributed. It is sufficient to allude to but a few only of them. Among the rare kinds are the multicole rye, colza, spelt, bassano sugar beet, Oregon wheat and Oregon corn, Cuba and California tobacco, &c.

We have not the means of ascertaining the influence of the introduction of these various plants on the products of the country. Could their silent bearing be accurately traced, we cannot doubt, from even isolated cases that have fallen under our observation, that it would be found to be far more extended than many suppose.

Some mention will be made hereafter in its place of the multicole rye, which is favorably spoken of in some parts of the country. By letter by J. Dille, Esq., of Auburn, New York, we have a statement of his success in raising the beet, &c. He says:

"As to the beet, I now give you an account of what I have done the past season. In the month of June I prepared one acre of land by manuring well, and then plowing it three times, and also by harrowing it three times, which made the land as mellow as an ash heap, as the saying is; then planted in drills 2½ feet apart, so that the ground could be cultivated with a cultivator, which was done three times; the drills were after each cultivating passed with a hoe to straighten it up, if needed, weeded clean. They grew well, and have done as well and better than I expected. When harvested they produced 1,020 bushels, which were estimated by measuring one load, and by estimating by load. This is what I call a great yield, which I am satisfied can be obtained every year with proper attention, and perhaps considerable increase. My cattle are very fond of them.

"As regards the English barley, I have grown it the past season; sown half an acre the past spring, which was well got in and in good order. At harvest it was kept by itself. It produced 25 bushels of good grain, which is at the rate of 50 bushels per acre, which will always make a good crop. I now use it for feeding, in order to ascertain its value for this purpose, and find it excellent feed."

A *third* collateral benefit, which must not be passed over wholly unnoticed, is the collection of books on agriculture in the library of this office. Many works of this description are highly useful to

the office, even if there were no duty imposed of making this annual agricultural report. But there are others, also, which are more closely connected with these particular labors. Works of great merit have thus been gathered at a very moderate expense in various languages, which are believed to be the sole copies found in this country. The ablest writers on agriculture, of Germany and France, thus contribute the results of their laborious lives, as well as the best authors on these subjects in England and Scotland.

Much pains has been taken to make the collection a really choice one; and it is believed that, for the number of volumes on these subjects, it is by far a more valuable collection than is to be found in any library in the United States. It is also believed that this is a subject of importance and interest, as thus the results of long years of experience and devotion to agriculture, both scientifically and practically, are brought within the reach of persons for consultation who may wish to avail themselves of such a means of improvement. The course adopted has been to purchase none but such as are known to be deserving, or which are highly recommended by the best judges in the foreign periodicals. The time will come when the rich treasures of these volumes will be more fully laid open to the agricultural public, and their influence be very considerable in regard to their application to this great element of our national prosperity.

Some changes have taken place the past year in the agricultural periodicals of our country. Among these, we may mention the union or merging of that well known and useful one, "The Farmers' Cabinet," of Philadelphia, with the "American Agriculturist," of New York.

We shall miss the familiar face of the "Cabinet," which we have ever counted as a journal of much merit; but it is a matter of gratification that so able a work as the "American Agriculturist" occupies its place with its subscribers. The "Missouri Farmer," also, has ceased to be published. It was but a beginning, and, therefore, it could scarcely be conjectured what it would have been.

Among the new works of the kind, we have observed the "Pennsylvania Cultivator," published at Harrisburg, and the "Vermont State Agriculturist," published at Burlington, in a handsome quarto form of sixteen pages, monthly, at the price of one dollar per annum.

"The Farmers' Library," a monthly, heretofore issued at New York, has also closed, and its veteran editor is now conducting a new and promising monthly work at Philadelphia, which bears the comprehensive name of "The Plough, the Loom, and the Anvil," at three dollars per annum.

The agricultural journals exert a very powerful influence on the advance of this science and improvement in practice throughout our country. They deserve a better patronage. The money paid for their weekly or monthly visit, laden with stores of selected knowledge and the fruits of able thinking, is well expended. The farmer and planter may not be aware how much what he has read has shaped his opinions; but could their whole connexion and bearing be traced out, no doubt it would be seen they have moulded

and modified his plans, and added much to his means of agricultural prosperity. The more full the patronage, the more valuable will these journals become. The editors are men who are well trained to their profession, and have a love for the object which they are so variously promoting.

The progress of agricultural education seems also on the advance; and it is believed and hoped that the experiments making of well conducted lectures on this great subject in our colleges and academies, promises success. Future years will unquestionably show a rich harvest of results in these begun enterprises. The influence of the professors, and the pupils trained under their teaching, will be, it is confidently expected, to diffuse more correct views of the scientific relations of agriculture; and the original investigations thus prompted and secured will redound in many an honorable tribute to the talent and experience of our fellow citizens.

Every successive year thus may multiply almost in a geometrical ratio the benefits; and ere long, over every part of our land, will be found men whose sound practical and scientific knowledge on these topics will guide the opinions of yet more and more of our husbandmen.

It is an attribute of extended intelligence to impart more liberal and expanded views; and minds thus acted on will be less liable to feel selfish ends. The co-operation of such men has been most willingly tendered the office, and we are indebted to many of them, not merely for their countenance and expression of approbation, but also for counsel and aid in conducting the business placed in our hands of gathering results from every part of our country. Did we follow out the dictates of our feelings, no slight expression of our thanks would be the one we feel bound to render to many who have entered with earnestness into the work, and performed the requested labor and furnished the aid which has so essentially contributed to give value to our annual summary of the progress of agricultural industry. The communications of our correspondents have not only been more full, but evidently show a much greater care in their preparation.

Many of them contain most interesting developments of the state of agriculture in the different parts of our country, and exhibit such an excellent state of feeling in reference to future efforts, that not *our* thanks only, but those of all who may prize these collections, are due to them.

We have placed quite a number of them, more or less full, from different States, with the circular in appendix No. 3, as they furnish many details which could not be brought into tabular form, and, so far as they go, enable us to form a comparative judgment of the crops, of the modes of tillage, and a variety of other particulars relating to agricultural industry. One of the most elaborate reports, from J. Delafield, esq., President of the Seneca County Agricultural Society, of New York, which has afforded us much valuable information, had been already sent into the New York State Agricultural Society, and has not made its appearance in their general report.

It may not be improper here to advert to the course adopted in securing these contributions to the object. In March last the names of the presidents and secretaries, and other officers of agricultural societies, farmers' clubs, &c., as well as of men of known character as intelligent farmers and planters in every State of the Union were obtained. To these persons a circular, prepared with much care, and embracing a great variety of particulars, was addressed, requesting their aid in filling the blanks with the needed information. This call has been more promptly responded to than has been the case to any previous one, and, by the help of the details given, a number of valuable summaries have been prepared, which will be found in their proper place in this report. These are condensed by the collation of a great number of such minor reports, and, though occupying in their present form but some few pages, have been the labor of days, and have been collected by the most careful transcription, and averaging and combining of particulars, spread over many sheets of manuscript. They are, as to their extent of induction of facts, certainly new in this country; and, if regarded as the beginning, furnish an exhibition of possible results most promising in any future pursuance of the same system of means.

To render this statement more clear, we would refer to the form of the circular in the appendix 3, as well as to a number of the replies of our correspondents, which from their value we have also annexed to this report. We have reason to believe, that the aim of those who have contributed their aid in furnishing the facts, on which this report is based, has been to avoid all exaggeration, and it may generally be assumed that they have fallen short rather than exceeded the actual results.

The figures of the census, which is so soon to be taken, will show whether or not we have been so very wide of the mark, or if anything, if our error has not been on the safe side of falling short rather than going beyond the actual truth.

One or two instances we have noticed which may help us to judge in this matter. In certain cases pains have been taken to ascertain the amount of some particular crop in a section of the country, and a comparison of the statements with our own has convinced us that if we have erred, it has not been in exaggerated estimates of the crops, considering the census of 1840 as the basis for other years.

To advert to a few of these which may make this fact more apparent.

In some of the States there have been enumerations taken by direction of the legislature since the general census of 1840. A comparison of these reported results, with those of the census of 1840, in many cases shows a vastly greater increase than a proportionate part of our estimates would give, so that were the same per centage to be adopted for the whole State, which is that of a particular county quoted below, the amount of the crops would vary much in our favor from those in our tables.

Thus in the county of Putnam, Illinois, the amount of products by the census of 1840, was

Wheat	40,885	bushels.
Oats	46,572	do
Indian corn	71,273	do

The amount of products of this county for 1848, is thus given by an intelligent correspondent after a careful investigation, and based on the State census of 1845:

Wheat	150,000	bushels.
Oats	60,000	do
Indian corn	300,000	do

This increase is far larger than we have allowed in estimating the crops of the State for 1848, based on the census of 1840.

In the Prairie Farmer of September, we find a statement that the assessor of the county in the spring took measures for ascertaining the number of bushels of wheat, &c., raised there in the previous year, 1847. The following is the result:

Wheat,	82,552	bushels.
Corn	850,180	do

The same products are given by the census of 1840, as follows:

Wheat	10,111	bushels.
Corn	398,690	do

In the October number of the same periodical, Fulton county is said to produce the following crops:

Wheat	1,000,000	bushels.
Corn	2,000,000	do
Oats	500,000	do

In the census it figures thus:

Wheat	105,000	bushels.
Corn	608,886	do
Oats	127,059	do

Even should we admit the statement in the last case to be perhaps somewhat conjectural, yet as put forth by responsible persons in the county itself, who seem to have taken pains to form a correct conclusion, it must be supposed to approximate to the truth; and should we apply these rates of increase to the crops of the whole State in reference to the census, it will be seen that the result will far exceed our highest calculations.

Take the case of Sussex county, Virginia. According to the census of 1840 it stands—

Wheat	18,777	bushels.
Oats	103,986	do.
Indian corn	404,793	do.

The estimate, by a gentleman resident there, for 1848, based on

an actual examination of a school district, and a comparison of the various districts in the county, is as follows:

Wheat	25,194	bushels.
Oats	91,200	do
Indian corn	300,735	do

Carrying a similar estimate or per centage of decrease over to the State, and it will be seen, in comparison with our own, that we have placed the crops lower than we might have been justified in doing.

We might cite other cases, but they would be only multiplying the same kind of facts. We have, perhaps, offered enough to answer our object of vindication, so far as needed.

With reference to population, the same remarks will probably be equally applicable; as a single instance we may refer to the case of Arkansas. The governor, in his late message, estimates that, in 1850, the population of that State will reach 300,000. This is a far higher estimate than ours would make it. So that it may be safely assumed, and we feel confident the results of the census will confirm it, that the annual estimates have fallen below rather than exceeded the truth. This is as we have intended, and the country is actually more capable than we have stated.

Another fact has not been sufficiently adverted to by some, who have claimed an error in our estimates.

It was noticed in our last report, but perhaps not sufficiently elucidated.

The cotton crop, it is known, is one of the most difficult of all to give with accuracy at the time when our report is presented. Sufficient attention has not been paid by objectors to our estimates to the particular objects we have in view. It is not to give the amount which actually finds its way to the market, but the amount produced. The amount collected at the various southern ports is known in the course of the year with great exactness, but to quote this amount as the true result of production is by no means so decisive.

No allowance is thus made for what is used in all the interior of the States where it is raised, and which never finds its way to these ports. Then, again, the loss in various ways, by fire and other means, deserves to be taken into consideration. Of this no account is taken in prices current of New Orleans, and other southern cities. Does not, also, another portion, small no doubt it is, pass over into some of the more northern States, as Ohio, Indiana, &c., without appearing in any of these tables, being in such a way of trade that no notice is had of it at any of the points whence the accounts are gathered? Add together the cotton which may fall under these items, and will there not be sufficient, allowing for the slight difference occasioned by presenting the estimate in pounds instead of bales, to account for the excess of our estimated crop, over the result as exhibited in bales in the various southern ports?

This last method of gaining the result, indeed, is of essential importance, to enable us to form correct views of the crop, when

taken in connexion with other means of information. It must ever be the case however, that it will not exhibit the precise result of the product. A portion of a former years' crop may be kept back and mingled with that of the current one in the market.

The census, on the other hand, if correctly taken, would exhibit the true results of production, not of domestic export. The same applies, likewise, in still greater force to the estimates of the wheat crop, or that of Indian corn, or potatoes, from the amount that is concentrated at particular ports. This method of estimate is the one which is mainly relied on by many. Were there such a system in operation as prevails in Great Britain, and presented in the Mark Lane Express of London, by which accurate reports are furnished from every part of the whole country weekly, no doubt great reliance might be placed on them. But there is not, and the quantity arriving at the Atlantic by no means forms a fair exhibit of the production of the country.

There are many causes which operate to prevent even the proportionate quantity, which shall be the exponent of the whole crop, from being found in the market, often till long after the confident opinion is expressed by way of censure on our report.

By watching these statements, and recurring to the opinions gathered from correspondents in all parts of the country, as well as by condensing the results given in the journals of those regions which furnish the various crops, we are well satisfied of the position we have taken. Great allowance must no doubt be made for a defective mode of taking the census, and the errors which have been the result.

But if accurate, taken as a basis, and proper care being given to the collecting and comparing information on the subject, it is believed a fair approximation may be secured.

The reports of former years, have so fully pointed out the elements to be used, and the labors employed in reaching the result of the estimate made, and procuring and condensing the various information included in such a public document, that it is believed unnecessary to advert again particularly to these topics. As a natural consequence these must increase the more extended the investigation becomes, and very considerable attention has been paid the past year to German and French works on statistics for the purpose of enlarging the field from which this aggregate of facts is to be gathered.

Were still greater efforts and more care directed to its execution, the census would secure this object. Among the varions topics which it is desirable to have brought out, are the amount of the cultivated or uncultivated lands, whether woodland, pasture, or plow land, gardens, nurseries, &c., and the quantities devoted to the several crops of tilled land; the average crops, taking one year with another for several years; the average consumption subdivided into that used by man or by the animals for food, or for seed, or for manufacture, the value; and similar particulars respecting which at present almost all are so very ignorant.

In an able German publication, statistics are divided into their *hydrographic* relations, the *orographic* and *geological.*

The climate and weather, amount of population, difference of classes, the agricultural population, and divisions of the crops, &c., are recommended as objects of attention. The unproductive soil is divided into land and water, ponds and rivers, brooks, marshes, &c.; stony, sandy, peaty, rocks, woodlands. The agricultural or productive, into tilled, meadow, pastures, orchards, gardens, &c.

Count Gasparin, in his valuable Cours d'Agriculture, of which the first four volumes have been published, considers it in the most extended sense as comprising:

Agrologie, which includes an examination of the nature of the earth in regard to its products.

Rural mechanics, which develope the means we must employ to lay open and divide the earth—i. e. first, the instruments; second, the forces to put them into motion.

Hydraulic mechanics, which relates to the provision of water—either from the earth by *capillary attraction*, or by instruments required; also carrying off the excess of water in any case desired.

Horticulture.—Agriculture, as it relates to gardens, &c., embracing the proper supply of heat, light, &c.

Rural meteorology embraces the operation of the seasons, weather, &c., on cultivation.

Rural architecture.—The means of preserving crops gathered against the influences of bad weather, &c.

Agricultural chemistry, which relates to the nutrition of plants by means of manures, &c.

Rural economy embraces the relations of agricultural to government, trade, manufactures, &c., &c.

It cannot be expected that the report now prepared should enter largely into all these topics; still, as the division is a good one, and comes to us recommended by so high authority, it will be useful to bear it in mind.

Considerable progress has been made in gathering a comparative table of the season for sowing, harvesting, with the amount of seed and the average product per acre; the kinds and varieties most successful, and the soil favorable for the purpose. It has been combined by collating several reports from a State, and the various averages have been made with care and reflection.

The proof of the correctness of the table may be found in the fact we can state, that there has been very great coincidence in the several independent reports in respect to these topics; far more so, indeed, than we had any reason to expect; and this is the more remarkable, also, as the attention of many of our correspondents seem to have been now called for the first time to the topics suggested.

Some attempts have also been made to ascertain the proportion of cultivated land in different parts the country; the most approved rotations, the value and amount of fodder—of cornstalk and straw fodder—and the proportion this bears to the grain, as well as the prices of various agricultural products. Viewed as a beginning,

the result of this effort has been encouraging; and it is hoped that hereafter a more ample collection of materials will be obtained for the same purpose.

We have been thus enabled to present the comparison of agriculture as it is practised in nearly all the different States of the Union. At a glance, as it were, not only may the productiveness, but also the value of crops which are raised be ascertained, and a basis is furnished more complete than has heretofore been at command for deductions in regard of this great branch of our national industry. In almost all the instances we have reason to believe that these details, if not precisely exact, are yet fully reliable; more so, indeed, than at any previous year, since they are compounded of a greater variety of communications, and the experience of the past has been brought in to aid in their preparation.

A greater number likewise of estimates respecting the cost of raising corn and wheat has enabled us to give a comparative view of this point in economical husbandry, while the suggestions as to the modes of cultivation will no doubt be acknowledged as another valuable accession to our former materials of interest to the farmers and planters of our country.

In comparing the statements respecting the planting season, it will be seen that there is, between the extremes of our country—Florida or Texas, and Maine, Wisconsin and Iowa—at least two months.

This may be observed in respect to the Indian corn crop. Thus, in Texas the time of planting is stated to be February and March, while in Maine and Iowa it is given in May. Of course, the time of gathering differs in a similar manner. From these two points we notice a regular gradation.

Judging from the accounts, there appears to be little variation between States in the same parallel of latitude in these particulars.

There is one point of advantage not so apparent now as it may be hereafter, when the lines of communication shall have become greatly multiplied, in those sections where the same can be planted and so gathered in advance of the other, it can be earlier in the market. Thus, potatoes may be supplied from the more southern point to the more northern one for perhaps a month before the crop in the latter is ripened, fit for use.

Numerous details have been gathered respecting the state of the weather, and they have been used for the purpose of preparing a condensed statement on this subject. It will be noticed that the circular of the office embraced this particular in reference to three periods, of planting, growing, and harvesting or gathering season; also, with reference to the mean temperature for the different months, and the amount of rain which fell. As the attention of the farmer has not been generally directed to any such records, and they are unprovided with means of forming accurate conclusions on the subject, it was hardly to have been expected that we should have been successful in procuring replies to these questions. It was thought proper to include them among others, as they might excite an interest, and turn the thoughts of some to observa-

tion, who might thus hereafter afford valuable assistance in this respect. We have been favorably disappointed in regard to the notice taken of them by our correspondents, and augur favorably from this indication for the future. Though not sufficiently extended to embrace the whole of our country, so as to present a complete weather table, yet we have derived many valuable hints from them, by which we have been enabled to give, as it were, at least a more accurate view of the subject. In our observations on this topic, we shall avail ourselves of these authorities, without deeming it necessary to enter into exact specifications.

Dividing the season, therefore, into three periods, we shall commence with what may be included in the growing period of wheat sown in the fall, and which has to endure the winter. Taking the whole country through, the winter season of 1847–'48 was a mild one.

Comparatively little snow fell in those sections where it might have been expected, nor was there extreme cold, nor much rain.

Thus the Prairie Farmer, of February, states that there then had been only a few days of cold weather in December, and snow had fallen only enough to cover the ground about two inches. A correspondent of the same paper, from Dubuque, Illinois, speaks of the winter as an unusual one, much rain and little snow, and mentioned that "bees had been flying about every week during the winter." Similar testimony is given respecting the weather in others of the States in the higher northern latitudes.

In New Hampshire, in the vicinity of Charlestown, an intelligent observer informs us, that the winter was "unusually mild and broken."

In Massachusetts, near the seacoast, though the snow continued somewhat longer than common, it, however, disappeared in the month of March.

In Michigan, and the northern part of the State of New York, the winter was quite mild.

The proper planting season in the northern section of our country, which begins in April, and extends into May, and when the principal crops are sown or planted, appears to have been most favorable. We can but allude to a few of the numerous proofs we might here cite in this respect.

Thus the Prairie Farmer, of May, states that "the season has been more pleasant than any of which we have any recollection, since our residence in Illinois." The month of March, and the first part of April, are said to have been without exception uninterruptedly mild and beautiful, and the weather, though not very warm, is declared to have been clear and steady, with a few refreshing rains.

In Putnam county, Illinois, the season is stated to have been a remarkable one for planting. The winter was mild, March and April a little too dry, but May with its gentle showers supplied the deficiency. In Iowa, too, the weather at the planting season is said to have been rather cool and dry, but in the main favorable to

the crops. In Michigan, the weather is described as being dry and cool at the planting season.

In St. Lawrence county, one of the most northern in the State of New York, at sowing and planting in spring, the information is that the season was warm and dry, just rain enough to cause the seed to vegetate, the thermometer ranging at about 60°.

In Windsor county, Vermont, the state of the weather at seed time was very favorable for that climate. Though April was dry, yet after that, there was no want of rain. In New Hampshire, we are informed that the spring came on pleasantly with abundant rains, the warmth did not increase with the length of days, May was unusually cool and moist. Still further east, also, in Piscataquis county, Maine, the weather is characterised as having been cold and wet in May.

Taking a somewhat lower range of latitude, we find the winter and spring in the main corresponding to those of the States just mentioned. The indications are perhaps, however, of greater frequency of snow.

The Ohio Cultivator, published in Columbus, presents some details on this subject, from which we derive the facts, that in most of the States snow fell to the depth of a foot on the 18th and 20th of December, and remained with very cold weather for about ten days, then there came on a sudden thaw.

The Ohio and its tributaries in the middle of December, flooded the adjoining levels, and did great damage. Snow again fell in the early part of January to the depth of six inches, but it lasted only about a week, and then there was another thaw; the weather was cold, the thermometer being at Columbus at zero, and in Chillicothe at 8° below it. The winter is, however, said not to have been unfavorable to the winter crop. The latter part of March and in the early part of April, the weather is stated to have been remarkably fine and warm, the vegetation rapid, though so dry as to need rain, and towards May becoming cooler, an inch or two of snow having fallen on the 19th of April, followed by two or three frosts. In the month there was a sufficiency of rain.

A favorable spring or planting season is also noticed in New York and Pennsylvania, though some apprehensions were expressed respecting the drouth in the latter part of May. As mentioned in a report from Delaware county, Pennsylvania, the number of days of rain during the months of April and May, the grass season, was only six. In New Jersey it was rainy during the planting season.

In Lancaster county, Pa., the state of the weather in the winter and spring, is described as having been more dry than for many years past, very little snow the winter past, the ground not being thoroughly soaked in spring as usual, and no freshets having occurred.

The ground and the weather were both in fine state for putting in spring crops, and even the dryness which prevailed is said to have injured no crop seriously.

A similar testimony as to the mildness of the weather in the winter, and the favorable character of the planting season, is very

general in Virginia, South Carolina, Georgia, Alabama, Mississippi, Tennessee, Texas, and Florida.

In western Virginia, the early part of the planting season is described as dry and favorable, the latter part moist, and the same favorable report is made of eastern Virginia and Maryland. So in South Carolina, a report from Newberry district informs us the season was good at the last planting time, and continued thus till about the 1st of July. In Georgia, we are told that it was a remarkable season for planting. The winter was mild, March and April also, though, perhaps, a little too dry, and May succeeded with gentle showers.

In Barbour county, Alabama, the spring was unusually forward and favorable, warm and dry.

The copious rains in May, are mentioned in an East Florida journal, as having refreshed the famishing earth, and invigorated the crops. In Mississippi the planting season is characterised as being very fine weather, while in Tennessee it is said, there was a moderate winter; the first of it (probably about the same time as mentioned above in Ohio,) the rain was so abundant, that the Cumberland and Caney forks were swollen higher than they had been since 1826; the latter part of the winter was mild, yet very wet; the spring opened early, giving an opportunity for early planting in the first days of April. The whole season was favorable, and the latter part of May was dry. In Texas the winter was mild and the spring early.

It will be seen, therefore, that, with the exception of some few localities where they might have suffered by being winter killed, the crops so far as being well planted, were most promising up to June. June, July, and the early part of August, covers the hay and grain harvest in all the States where these crops are raised in the largest quantities, while they may be considered properly the growing season of the corn, cotton and tobacco, potato, hemp, and sugar crops. We will, therefore, briefly take a survey of the weather during this period.

Beginning, as before, at the northwest section of our country. The early part of June appears to have been dry and somewhat cool; the latter portion of the month and July more rainy, but still cool. Taken as a whole, however, the harvest season was a favorable one. In Michigan, indeed, we are informed that there was an uncommon amount of rain, which commenced the 4th of July, and produced a wet harvest. Indeed, it is said that season has not been so wet since 1836, and even that is thought to have been less so. The rain in Michigan, in one account, is stated to have been in July 11.38 inches. A similar state of the weather is mentioned as having been experienced in Iowa, northern Indiana, St. Lawrence county, New York, New Hampshire, Piscataquis county, Maine. There was some differences, however, as to temperature; for, while in Iowa we are told of its having been unusually cool, in Maine and in New Hampshire, in St. Lawrence county, New York, the thermometer ranged from 75 to 80 degrees of Fahrenheit.

Further south, comprising the State of New York, Pennsylvania,

Ohio, and down to Virginia, during the harvest, the weather for the most part was fine and very promising. A sufficiency of rain in general is mentioned. In some parts of these States there were diversities; but, as a whole, the testimony is as we have mentioned. It is deemed unnecessary to go into particulars, as the statements, in most cases, are so nearly similar.

In the southern and southwestern States, the month of June and the early part of July were warm growing periods, very favorable to the progress of the crops. Some of the accounts describe the weather as most delightful, with a sufficiency of rain, in gentle showers, to promote the advance of the cotton and other products of the earth.

In July, however, a drought commenced not only in this section of the country, but through the middle and eastern portions of the northern States, which reached into and through, in some cases, the month of August, and till the middle of September. It was for some time feared that the corn crop, which felt it, especially toward the latter part of its continuance, would be materially injured by it. Everywhere along the sea coast great complaint was made of the pastures and brooks drying up, the extreme dustiness of the roads, and all the usual indications of protracted heat.

It is remarkable, however, that in other portions of the interior, especially in the States of Ohio, Indiana, Kentucky, and Tennessee, and in Western Virginia and Pennsylvania, as well as in Alabama, in the middle and latter part of August, mention is made of damage done to the crops by the excessive rains which had fallen. The drought broke up, in the places where it prevailed most, about the last half of September; and, as there were no early frosts, the corn, although stinted in some measure by the action of the excessive heat, proved to be a very fine crop, though not by any means equal to the promise of the earlier part of summer. The warm weather may yet have been favorable, on the whole, to the potato crop.

In the communications of our correspondents, in the Appendix, will be found statements and hints respecting the season and quantity of rain, &c., embraced under this branch of the report.

We insert a few which we have extracted from them.

In Yates county, New York.

Month.	Prevailing weather.	Mean temperature.	Amount of rain.
			Inches.
April	Dry and cold	43°.00	.63
May	Wet	57°.70	3.36
June	Wet part of the month	64°.53	2.36
July	Rather wet	65°.77	3.19
August	Generally fair	68°.32	2.78
September	do	54°.90	1.97
October	Cloudy, but not much rain	47°.96	.87

Wet in planting time; fine harvest weather; fine seeding weather; seeding in fine time.

The rain in the month of July, in Washtenaw county, Michigan, was noticed as 11.38 inches; and, during the entire harvest, averaged three days per week.

In Delaware county, Pennsylvania, number of days of rain, in April and May, (grass season,) 6; from May to end of August, (grain season,) 14 days.

In Lamoille county, Vermont, the thermometer, at 12, from 17th of June to last of July, ranged from 64° to 94°—mostly over 80°. The hottest day, (21st of July,) 94°. The coldest of the winter previous, (11th of January,) 34½° at sunrise.

In Barbour county, Alabama, the harvest months were dry, the thermometer ranging from 86° to 90° during the crop seasons.

In Jefferson county, New York, the following is stated to be the result of the weather:

Month.	Amount of rain.	Barometer.	Thermometer.
January	1.84	28.04	20° below 0.
February	.87	27.67	8 do.
March	2.61	28.14	6 do.
April	1.69	28.22	18
May	3.01	28.40	41
June	1.33	28.29	35
July	4.49	28.53	53
August	1.87	28.52	53
September	3.18	28.52	32
October	4.20	28.20	22
November	2.55	28.48	4
December	3.77	28.14	8 below 0.

In Wayne county, Michigan, the amount of rain is given: for May, 5.865; June, 2.528; July, 11.38; August, 7.369; September, 7.216; October, 4.216. The maximum, in May, 79°.64; June, 89°.52; July, 82°.56; August, 86°.60; September, 79°.38; October, 69°.33.

In Lee county, Iowa, from 5th of March, monthly mean, 44°.98; 5 days entirely cloudy; snow 1 day; rain 6 days. April, mean, 53°.35; 4 days entirely cloudy; rain 5 days. May, mean, 68°.24; 5 days entirely clear; 4 days entirely cloudy; rain 11 days. June, mean, 92°.89; 8 days cloudy; rain 7 days. July, mean, 72°.28; 8 days clear; 2 cloudy; rain 14 days. August, mean, 73°.41. September, mean, 61°.30. October, 52°.82. Amount of rain, April, 4.67 inches; May, 5.90; June, 4.75; July, 14.20; August, 4.50; September, 4.40—total, 38.42 inches.

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In Berkshire county, Massachusetts:

	Amount of rain.		Mean temperature.
1847,	October	4.058 inches	52°.41
	November	1.851 "	41°.04
	December	5.885 "	37°.76
1848,	January	1.403 "	27°.17
	February	1.129 "	20°.10
	March	2.292 "	29°.14
	April	1.081 "	41°.54
	May	7.914 "	58°.90
	June	1.750 "	63°.09
	July	4.479 "	67°.72
	August	2.943 "	67°.57
	September	2.354 "	53°.70
		37.143+	46°78

In Charleston, South Carolina, in April, the maximum of the thermometer was 89°; on the 22d day, minimum 39°; on the 21st, the range 48°; the range of the barometer, 79 ;rain, in inches, 2.73. In May, maximum of thermometer, 91, on the 7th; minimum 47, on the 13th; range 44°; range of barometer, 42; rain 5.85 inches. In June, maximum of thermometer, 86°, on the 21st; minimum, 58°, on the 2d; range 28°; range of barometer, 22; rain 2.58 inches. In July, maximum of thermometer, 86°; minimum, 70°; range, 16°; of barometer, 38; rain, 5.16 inches. In August, maximum of thermometer, 86°; minimum, 66°; range, 20°; of barometer, 34; rain, 1.95 inches. In September, maximum of thermometer, 92°, on the 1st; minimum, 51°, on the 23d; range, 41°; range of barometer, 40; rain, 0.42. In October, maximum of thermometer, 80°, on the 10th; minimum, 42°, on the 21st; range of barometer, 52; rain, in inches, 3.56.

Monmouth county, New Jersey:

			Mean temperature.
Stormy in	December	105 hours.	
1848,	January	21 "	40°
	February	66 "	35⅓°
	March	48 "	32½°
	April	30 "	37½°
	May	66 "	52°
	June	30 "	64⅛°
	July*	42 "	71½°
	August	24 "	74½°
	September	18 "	73½°
	October	90 "	65⅓°
	November	30 "	55½°
	Mean, from January to December		53½°

* The quantity of rain that fell from July 1 to December 1, is 14 8-10 inches.

Princess Anne county, Virginia:

		Mean temperature.
1847,	October	56°
	November	54°
	December	49°
1848,	January	46°
	February	46°
	March	45°
	April	50°
	May	63°
	June	69°
	July	69°
	August	78°
	September	77°

Mean annual temperature, 58°.

Baron Von Humboldt, in his Cosmos, alluding to the variations of temperature and the causes which influence them, attributes much to the influence of the sea in equalizing temperatures. He says on this subject: "It moderates both the asperity of winter and the heat of summer; hence arises a second important contrast—that between insular or littoral climates (enjoyed also in some degree by continents whose outline is broken by peninsulas and bays) and the climate of interior of great masses of solid land." He adds: "Leopold Von Buch was the first writer who entered fully into the subject of this remarkable contrast, and the varied phenomena resulting from it; its influences on vegetation and agriculture; on the transparency of the atmosphere and serenity of the sky; on the radiation from the surface; and on the height of the limit of perpetual snow. In the interior of the Asiatic continent, Tobolsk, Burnaul on the Obi, and Irkutsk, have summers which in mean temperature resemble those of Berlin and Munster, and that of Cherbourg, in Normandy; and during this season the thermometer sometimes remains for weeks together at 86° or 87°.8 Fahrenheit; but these summers are followed by winters in which the coldest month has the severe mean temperature of 0°4 below, to 4° above cypher Fahrenheit. In this connexion he remarks: "I have in no part of the earth, not even in the Canary islands, or in Spain, or in the south of France, seen more magnificent fruit, especially grapes, than at Astrachan, near the shores of the Caspian, in lat. 46° 21′, with a mean annual temperature of about 48° Fahrenheit, which is that of Bordeaux; while not only there, but also still more to the south, at Kislar, at the mouth of the Terek, (in the latitude of Avignon and Rimini,) the thermometer sometimes falls in winter to 13° to 22° below cypher of Fahrenheit."

In our remarks on the progress of the crops it is not intended to go very minutely into details. We have a vast quantity of materials, which would fill pages; but as the ground on which our estimates are based, after being so distinctly stated in former reports, may be presumed to be well understood, it seems unnecessary to do much more than give the general results. We rely as before mainly on agricultural sources; that is, the agricultural periodicals

and correspondents who are practical farmers and proprietors of crops, as well as of others who, from their opportunities of knowledge, form the safest guides to whom we can refer.

Before a more particular consideration, we will just give a glance at the principal crops as a whole, in order to present at one view the general aspect of the great agricultural products of our country.

The wheat crop, as a whole, is believed to have been a good one. The breadth of land sown was probably larger than ever before sown. This was owing partly to the increased market, and partly to the new lands for the first time brought under cultivation. The success of the crop, in the main, was favorable. Some complaints of its being winter killed were made in sections of the wheat growing districts, and now and then, also, it appears to have suffered from insects and rust, but on the whole was quite free from these evils.

The amount raised per acre compares well, also, with that of former prosperous years. In most cases it is thought to have been more than an average crop.

The condition of the grain in general is described as being good. The state of the weather at the harvest secured its being got in in a fine state of dryness; and though the straw was heavy, yet the grain also was well filled, and of a proper color and weight.

So far as can be ascertained respecting barley and rye, which are but partially raised, these crops also were above the usual average for the amount sown.

Oats succeeded better than common, and the crop is a satisfactory one. Buckwheat is but little noticed, but is believed to have been an improvement on the crop of last year.

Indian corn, notwithstanding the fears which were entertained respecting it at one time, and the partial injury it may have sustained by the drought, has proved to be a very great crop in some portions of our country. It is a favorite crop, and admits of being applied to so many uses for stock, that it will probably be always one of the main reliances of the farmer in our country. The increased quantities which are raised in the West are easily accounted for by the little labor it costs to raise it on a large scale, and the vast amount which is consumed for the feeding of hogs, which form so large a proportion of the animal stocks of the great farms there. The prospect of its becoming a better article for exportation has likewise stimulated to higher efforts at its production.

Estimated at a moderate price, it will be seen that the millions of bushels raised must reach to above $100,000,000, and thus forms a large item in the agricultural wealth of our country. If turned into pork and lard the value is yet more enhanced.

The potato crop has suffered as in former years by the rot, but the evil has been more local, and would seem to justify some hope that it may gradually pass off in its progress westward. Aside from this, the amount of bushels raised is very considerably larger than last year. Experience has taught our farmers, if they cannot

wholly avoid the evil, yet to guard in some degree against its worst effects.

Hay is fully an average crop. The moist season of the spring appears to have been favorable, and the warmth of the summer both brought it forward and enabled the farmer to secure it in good order. Considerable hay may have been consumed in those parts of the country where the drought was severest, and where, from the drying up of the pastures, farmers were obliged to keep their stock by foddering; but this extremity was local, and perhaps has not exercised any important influence on the crop, as a whole.

It is difficult to get at a correct account of the hemp crop. It would seem, from the best view we have been able to obtain of the matter, that less attention is now paid to it than a few years since, and as there was a less breadth of land occupied, so the crop has not yielded as largely as in some previous years.

Perhaps the same may be said of tobacco, especially in those States where it has formed a staple product. The attention of the growers of tobacco seems to be gradually withdrawn, or rather turned to wheat or corn or some other product. This fact, in the Atlantic States, may have arisen in part from the competition opened to the west in this product by the increased facilities of transportation.

Cotton still continues to be the great crop of the south, even at the almost ruinously low prices that have prevailed of late. The crop of this year though subject to the usual vicissitudes and in some places cut off, yet on the whole is believed to have been as large as the previous year, and above an average one. An increase of the Texas crop may be expected in future years, and this fact, as the country extends its population in the cotton growing sections, will have a tendency to render the competition of the Atlantic States less able, and finally perhaps force them to resort to a change of crops, at least to a greater variety of the same.

The rice crop was a good one and well secured.

Of sugar it is almost too early to speak as yet, but we hope to be able, before the close of this report, to furnish as accurate an estimate both of this and the cotton crop as is in our power to obtain.

Wheat.—New York, Pennsylvania, Virginia, Maryland, North Carolina, may be regarded as the great wheat growers on the Atlantic slope, while Ohio, Tennessee, Kentucky, Indiana, Illinois, and Michigan furnish the largest portion of that which is raised in the west and northwest. A reference to the more prominent of these, in tracing the particular history of this crop, may be sufficient.

In a country like ours, it will doubtless always be found that the accounts will vary somewhat, even in the same State. Certain localities are more liable to be affected by the frost and cold of winter than others; and it will ever be the case that more or less grain is winter killed.

This was the fact during the last winter, though the evil was comparatively very limited.

We begin with Ohio. The editor of the Ohio Cultivator, (a good authority,) under date of February 15, 1848, states, that in travel-

ling from Columbus to Cincinnati, via Xenia, and back by the way of Portsmouth and Chillicothe, the wheat fields generally presented a healthy appearance, giving little evidence of injury from the winter. This route would take him through the southwestern tier of counties. The same appearance of the crop is also mentioned in that portion of the State a month later. The dry weather had preventeu the heaving usual, and to be expected.

At a month later still—in April—the reports from the central portion of the state were also favorable. The northern central counties, Huron and Erie, and the northwestern counties, however, seemed to indicate more failure. Many fields were thought to be winter-killed, especially on the more moist grounds. In the northeastern section, around Columbiana county, the crop looked well, except on the wet lands, while the rich lands of southern Ohio exhibited it as very forward.

As it advanced towards the harvest, in the month of May, we are informed that the wheat crop of Ohio never looked better, or gave better promise. In the great counties of Starke, Wayne, in Richland, Ashland, Knox, Licking, there was said to be scarcely a bad looking field; and the same was the case with the eastern and southern range of counties; while on the northwest it was nearly as promising. Thus it continued; and in June, (the middle of the month,) it is noticed that the wheat crop in Ohio was approaching to maturity, with the finest possible appearance; and in southern Ohio was considered almost past danger. In Delaware, Richland, Morron, Ashland, Lorain, Cuyahoga, Lake, Geauga, Ashtabula, Trumbull, Mahoning, Columbiana, Carroll, Tuscarawas, Coshocton, Muskingum, Licking, and Franklin counties, it is pronounced to be remarkably fine—as good as in 1846; and in some counties, even better. In the eastern portion of the Reserve, the quantity might perhaps not be so great as in 1846. A smaller amount had been sown, and the fly had somewhat lessened it from what it would have been. But in Columbiana, Tuscarawas, Muskingum, and Licking, the straw was remarkably bright, and the grain bright and handsome.

It would appear, therefore, from this authority, (and we could have none better,) that up to the time of harvesting, the progress of the wheat crop in Ohio had been unusually satisfactory.

There is much less complaint of blight, rust, or fly, than in many years, and perhaps than the general average of seasons. Even as late, too, as the 1st of September, when the harvest had been secured, we learn from the best of sources that the wheat crop of Ohio, from all accounts, was harvested without as much damage from the rains as many had anticipated, though considerable quantities had suffered a partial injury.

The progress of the crop, as gathered from other sources, is similar. Local journals notice its promising appearance in terms like this, in April: "We have made frequent inquiries of farmers and others from different sections of the country, as to the prospect of the winter wheat crops, and hear but one reply: that they are good, and that every thing now indicates a large yield."

Again: "the prospect of the coming wheat crop in this section of western Ohio never was, at this season of the year, more favorable than at this time." This remark is applied to the counties of Lorain, Portage, Wayne, Stark, Holmes, Columbiana, and Carroll, and so of others. In June and July, it is said of the harvest in the Miami valley, that the wheat crop comes in finely. The yield is more abundant than usual, and the berry generally better than it has been for years.

Indeed, from all the numerous journals we have examined to obtain a proper view of the progress of the wheat crop in Ohio, the testimony is so uniform and similar, that it does not seem necessary to quote from them more minutely. The section already pointed out, it will be seen by a reference to the census, comprises by far the largest portions of the wheat growing districts of this State, which is such an extensive producer of this grain.

We therefore only refer to the testimony which is furnished by the replies to the circular sent from the office, and various correspondents. In some instances, we have had the opportunity thus to compare two or more independent accounts from the same sections of the wheat growing districts, and have been pleased to see the evidence of correctness which is given by the mutual confirmation of each other's statements.

Thus we find it stated, that, according to the estimates of our correspondents, the increase has been large. In Highland county, for example, it is judged to have been equal to 50 per cent. In Richland county, in one portion of it, about 20 per cent.; and in another, although perhaps not an average crop, yet owing to a drier winter, and not so severe a frost, the advance was fully equal to 5 or 10 per cent. The ratio of increase is, in many cases, estimated still larger—even double the crop of 1847, on account of the season.

In Wayne and Defiance counties, about 25 per cent.—a full crop, compared with that of 1847, in Wayne—and 5 or 10 per cent. in Morgan county. We might go on; but probably the abstract of the returns to the Agricultural Board of the State, which will be found in an appendix, will enable any one to form a conclusive judgment on the subject.

If we pass over to Indiana, the history of the wheat crop is quite similar to what we have already given in respect to Ohio.

In March we notice statements that the wheat in the upper part of Indiana was generally uninjured by the winter, so far as could be judged. In April the crop was said to promise a good yield in this State. Such continued to be the case for the most part through the month of May, and in June. As the harvest drew on, in central Indiana especially, we are informed that it was thought to be superior in quantity and quality to any before harvested in that section of the State. It did not stand so thick on the ground as it should do; but the head was remarkably full and heavy—never, indeed, more so. Some fields were threatened by rust; but it was hoped that they would eventually escape it. There was likewise, here and there, appearance of insects; but these cases were rare.

After the harvest, also, the statements were equally favorable. Thus, in one account it is that the fall wheat harvest was an average crop—much better, indeed, than had been anticipated at the commencement of spring. The harvest of spring wheat, which is often relied on to make up any losses of the other crop, presented a fine growth on the whole; but considerable complaint was made, in certain sections, of rust. Some pieces were materially injured, while others were entirely destroyed; and others yet not at all affected. A new disease in the spring wheat, called the scab or spot, is noticed in Lake county; and the chinch bug had made its appearance.

The reports which have been made in reply to the circular of the office respecting the wheat crop in Indiana, correspond well to the above notices. The increase of the crop is estimated at from 10 to 20 per cent., and the favorable season is generally assigned as the cause, of course allowing for the greater quantity of land, which is continually brought into cultivation. In some of the counties it is also subjoined, that there was no injury from insects.

Illinois, with the bordering States of Missouri, and Wisconsin, and Iowa, are more particularly noticed from time to time in the Prairie Farmer, on the accounts of which much reliance may be placed, both from the high character of this agricultural journal, and also the facilities enjoyed of obtaining correct information. While as early as March, the accounts from portions of Wisconsin, represent the wheat, so far as could be judged, generally uninjured by the winter, in the northern parts of Illinois and middle Missouri, fears were expressed that owing to the constant thawing and freezing, considerable injury might be experienced. All the journals in the Rock river region, represent it as injured from these causes, and also, by want of snow. The Hessian fly was likewise said to be present in great numbers in the vicinity of Chicago; similar complaints continue in April. But the prospect changed in May, and we are told that the wheat crop, which at the close of winter appeared worse than ever before, had started into vigorous life, and was so far as heard from in a finer condition than usual.

In the western central portions of the State it is also said never to have looked better. In July and August, when the crop was gathering or already harvested, the testimony respecting it is very similar. It is said to be a fine yield, and the grain of an excellent quality to be abundant, prospects favorable for a superabundant harvest—a full average crop, and but for the damage by the rust it would have been much larger; 20 per cent., 50 per cent. more than for the previous year. This was likewise the case in portions of Wisconsin. But the general result was favorable, even if not equal to the view taken in the Iowa Farmer of the prospect from the number of acres cultivated. It is said there, that it was estimated that Wisconsin would send to market one-half more than in any previous year, and from the same journal, we learn in July, that the wheat crop came in tolerably full; some fields were indeed as good as at any former year, while others proved a failure.

The injury sustained by the winter wheat was repaired by the

sowing a large quantity of spring wheat. In one of the replies to the circular of the office we are informed that, in southern Illinois, in consequence of the settled demand for some years past, the farmers every year sow more, and consequently the crop is more.

The wheat crop of Union county, Illinois, for 1847, was estimated at 75,000 bushels for exportation, and for 1848, owing to the additional ground sown, it is estimated as furnishing, for the same purpose, at least from 10 to 20 per cent. more. A similar ratio is given in a report from Iowa.

Michigan is every year rising in importance, both as a wheat producing and a wheat exporting State. The crop of the present year (1848) seems to have been a good one. Its early appearance was promising. Thus it is stated, in the latter part of March, that even those fields which had been deemed ruined had recovered and looked well, and that there was reason to anticipate a larger crop of wheat than Michigan had ever before furnished. Yet later, in May, the Michigan Farmer says, we continue to receive favorable accounts of the wheat crop from various and distant parts of the State. The present appearances wear the most encouraging aspect. In July a correspondent of the same journal states that, in travelling from that place to St. Joseph's county, the wheat promised to afford an average yield; there were a greater number of first rate pieces than of poor ones. An intelligent correspondent states that, from the best information he could obtain, derived from observation and the practical cultivators of the soil, some portions of the State have been more highly favored than others. For the counties of Oakland, Macomb, Lapeer, Genessee, from good authority it is stated, he says, that there has been harvested from 20 to 30 bushels per acre, while in the counties of Wayne, Washtenaw, Monroe, there has been a falling off of some 30 per cent. In the counties of Ingham, Eaton, Clinton, Ionia, Kent, Livingston, Shiawassee, the crops are stated to have been good with an increase of acres above the previous year. In the counties of Jackson, Calhoun, Kalamazoo, Branch, St. Joseph, Cass, Lenawee, Hillsdale, Allegan, Van Buren, Barry, and Berrien, the crops will exceed that of the former year, although the early sown wheat has suffered by the insect, while that sown after the 15th of September has produced a good yield. Therefore, taking the crop of the whole State with the progress of improvement, the amount must exceed that of 1847; assigning, as a reason, that there was no sleet in winter, and no fly, better season, and change of seed. Others speak of the per centage of increase at 30 to 50 per cent., 100 to 200 per cent. The foregoing, we believe, is a correct view of the wheat crop of Michigan, and can hardly doubt that should the next year prove equally favorable, it will be found from the result of the census, that we have underrated, rather than overestimated the amount raised. It will be recollected that for the past year or two there has been a very considerable influx of foreign emigration into this enterprising State, and large public works are also in progress, and all these things, if it did not multiply the producers, have to a great extent increased the number of consumers.

The State of New York still continues to maintain a high rank among those States which grow wheat largely. The wheat of this State, too, is regarded among the best of the northern States, and the attention paid to improving it has rewarded the cultivator with many a rich crop. The usual complaint of winter killed was heard in the early part of the spring, but as the season advanced and the harvest was close at hand, the prospects seem to have brightened. This was the case in the western part of the State, where such large crops are produced, while in the vicinity of Tompkins county, about the latter part of June, it is said there had not been a time within ten years when the wheat crop promised better. So during the harvest the advices are, wheat, both spring and summer, looks uncommonly well and yields abundantly. Again, the quality of the present wheat crop is excellent, and the kernels are mentioned as remarkably full and plump. The commencement of the harvest is also noticed as being earlier than usual. Again, in reference to to this crop, it is said in an agricultural journal: The wheat harvest in the western part of the State is in active progress. The product is abundant and of the best quality. In some counties, as Rensselaer and Sullivan, great complaint is made of the fly. This insect, sometimes called the weevil, seems to have gained such a hold in particular districts, as to have led to an extensive abandonment of the cultivation of this species of grain. Taken as a whole, however, it is believed that the injury received by its ravages was comparatively very slight.

The general estimate of the reports place the harvest considerably higher than that of 1847. The increase is put at from 10 to 20 per cent. and sometimes even higher.

The New Jersey crop, also, although comparatively a small one, is considered as better than that of the preceding year. The causes assigned are a better season and improved culture.

Pennsylvania produces a large wheat crop. As the spring opened the appearance of the fields is described as being promising. A month later also, in June, we are told that glorious reports of the wheat crop, which is now to a great extent harvested, are received. The rains, in some instances, produced rot, and thus a portion of the grain was lost; but in many of the counties the crops appear to have been the best ever known. The replies to the circular correspond to the above. In Lancaster, Adams, Dauphin, Delaware counties, the increase is estimated at 20 to 25 per cent., and the grain is spoken of as of a superior quality.

Some fields suffered from the old enemy—the fly; yet, on the whole, the season was so much more favorable and in some cases there was so much less injury from insects, that the crop largely exceeded that of the previous year. In but few instances only do we notice any indications of decrease from rust, and the whole of the unfavorable results are so rare, compared with the general success, that we believe they will not essentially affect the conclusion to which we have already arrived.

We have ample notice respecting the progress and results of the Maryland wheat crop; but, as they are very similar, it will not be

necessary to refer to more than two or three in each period. The prospects of the early spring appear to have been highly promising. In the month of May we meet with apprehensions entertained respecting the fly. In June, however, as the harvest commenced, the weather being fine, the accounts are all encouraging, and speak of the crop in various sections of the State as most abundant, unprecedented, never known to be better—a better appearance than for many years. The harvest is said, in some of the journals, to have been the earliest ever known, and the yield to have been not only an abundant one, but the grain itself of an excellent quality; and the heads are noticed as being heavy and well filled. In some instances, that which was left on the stalk appears to have been injured by the wet weather so that it sprouted, and partial loss is mentioned from this cause; but in general it was evidently a very large comparative increase.

The estimates given by our correspondents vary from 10 per cent., and upward.

The early appearance of the wheat crop in Virginia is stated to have been very favorable. In the public journals allusion is made to the "magnificently green fields promising a glorious reward" to toil; the prospect is said to be "cheering," and the wheat is noticed as having "come out of the winter well." The progress of the crop was rapid and most favorable, and, as the harvest drew on, it is described as promising to be extensive.

The harvest, as in Maryland, was earlier than usual, and the accounts given of it, in general, represent it as a large one—one of the best and most abundant harvests gathered in the State for many years past. The quantity and quality is said to be fair, even where at first complaint was made of the fly.

The replies of our correspondents at a later date concur in the above view of the harvest. In some counties it is estimated at 5 per cent.; in others from 10 to 25 and 30 per cent. The reasons assigned are an increased demand, better season, &c. On the James river it is said to have been not as large, on account of a freshet, the greatest one since 1795, and several hail storms, which in May destroyed the wheat in some places.

The wheat crop in some of the southern and southwestern States appears to have suffered from the fly and rust. We have notices of these injuries, especially in the upper part of South Carolina and portions of Tennessee; in the latter of which, also, mention is made of loss from back water of the streams.

In Alabama and Georgia it appears to have been an increased crop. In Kentucky, also, there seems to have been a gain on the previous year. As the amount raised in the more southern States, as well as in New England, is comparatively small, it is not thought necessary to enter into detail in the history of its progress. We have not sufficient means of information to enable us to decide with respect to this crop in Texas and Oregon, though it is believed, from all that can be gathered, there has been an advance on the crop of 1847.

Taking the whole country through, such, in our judgment, was the case for the general crop, and we have placed it accordingly.

As has been before observed, the prevalence of rust seems to have been limited—far more so than usual; and the injury of the fly, though the subject of complaint in some quarters, yet as a whole was comparatively small.

It is still a desideratum to prevent loss from these causes; and, as we have already done in former reports, we subjoin such observations on these topics as have fallen under our notice.

The superiority of the Mediterranean wheat appears to be maintained in portions of our country; at least, we may quote here two notices on this subject from the Ohio Cultivator, both of which relate to former years; but they may serve as testimony as to the general excellence of this variety of wheat for the purpose.

In the account of the best and most successful kinds used, which have been collected for the table found in the appendix and another portion of this report, the Mediterranean is most frequently mentioned in many sections of the country. In general, it would appear to have been remarkably successful.

The first of the notices above alluded to is that of Martin Gamble, Munroe county, Indiana, and is taken from the number of the Ohio Cultivator for January, 1848, page 4.

He says that he sowed his Mediterranean wheat on "a part of a field of wheat stubble, plowed in lands 8 feet wide, the soil rather sprouty and inclined to wet." The rest of the field, he sowed with a common variety. He then states the fly destroyed almost entirely the whole field, except the Mediterranean, which escaped the fly and stood the winter better than any he had.

It also weighed 64 pounds to the bushel, while the common variety weighed only 61 pounds per bushel. He considers it better adapted than any other to that part of Indiana.

The second case referred to we take from the same agricultural journal for May 1, 1848, page 69. In this the experiment lasted 3 years and with repeated success.

In the fall of 1845, one bushel and a half of Mediterranean wheat was sown in one corner of a field; the remainder was sown with the white chaff bearded variety. The ground was plowed twice, and the seed sowed and dragged in the first week in September, all at the same time.

From the bushel and a half, he cut 54 bushels, while from the other, from a bushel and a half of seed, he had but half the quantity.

In the fall of 1846, he sowed his Mediteranean wheat after the middle of September; in consequence of which, the wheat did not spread as well, and produce as much to the acre as before; but in this case, its proportional increase was equal to that before, when compared with the common variety.

Of the next trial, which was not determined when the communication was made, he speaks encouragingly; for, though the fly had injured wheat there in the fall previous, he says he could never discover any insect in the Mediterranean, even when sown in the same fields with the other kinds which were attacked.

Alluding to the reports that the Mediterranean wheat would not produce as fine flour, he says that the kind there has been fairly tested, and there can be abundance of proof that it will make as much and as white flour as any other wheat in that place.

He also states that it weighs 6 or 8 pounds more per bushel; it roots deep, grows rank in the fall, stands the frost better, is harvested about two weeks earlier, and on this account is not as liable to rust. He supposes the unfavorable report respecting the flour not being as fine, may have arisen from there being two or more kinds there passing under the same name. The same reason may, perhaps, be assigned for the apparent exceptions in some parts of the country, with respect to its freedom from the fly.

The following method of remedying the evil suffered by the Hessian fly has been sent us by Mr. Charles Gale, of Milton, Northumberland county, Pennsylvania. We give it in his own words. He says: "I have been a farmer for the last forty-six years, and as I have severely suffered for some years from the ravages of the Hessian fly, I became very much discouraged. Having at length, by close observation, discovered that wheat sown about the 1st of October generally escaped the attacks of this destructive insect, I adopted that season for sowing, viz: from the 28th of September to the end of the first week in October. This plan had the desired effect, and only in two instances has it failed for the space of nearly forty years, and in this instance it was attributable to extraordinary seasons, for the heat of summer extended into late autumn, accompanied with drought; 1847 was the last of these seasons; when, in consequence of too early sowing, a warm autumn, and a drought, with very warm weather in the spring, the crop of 1847 was the merest trifle that I every remember."

He also recommends as a cheap top-dressing for wheat, which is very efficient, to sow half a bushel of Genesee plaster as soon as the wheat is up in the fall, or very early in spring—not later than the first day of April—earlier if possible.

The suggestions of Mr. Gale would seem worth the trial, as they are based on so many years' experience; and even if successful but in one-half or two-thirds of the instances, would be, no doubt, a great saving of wheat in the whole country. If it should prove equally so as in his own case, many farmers would feel that this alone would amply repay the country for the whole volume of our report.

One of our most intelligent correspondents remarks, that the fly does not work in cloudy weather. Possibly this fact may suggest something in the method to be adopted for the prevention of its ravages.

The following method of preventing brand or rust in wheat, is taken from that most excellent German periodical, the Oekonomische Neuigkeiten, of Prof. Hlubek. It is given by a distinguished agriculturist, a correspondent of the journal just mentioned, Drobnik, of Bremen.

He says, for thirty years I have found the following successful: Place the sheaves of winter wheat, perfectly ripe, from the stand-

ing haulm to the hard grain, upon a thrashing floor, the ears upwards; beat them with a stick, and then throw them aside into an empty space; of the grain which has fallen upon the floor, perfectly ripe, and well filled out—which must first be thoroughly shaken up and cleaned in the granary—take the quantity necessary fr seed. Some hours, at the longest six or eight hours, before sowing, prepare a steep of three measures of burnt lime, reduced to powder, and ten measures of urine of cattle, so that two quarts of this steep may be poured upon one peck of the seed, and by stirring it up with a spade be thoroughly incorporated together, and every kernel be entirely covered over white by it. By using seed so prepared, rust of wheat of every kind will be avoided; and I have often noticed, that while in the neighboring fields, a greater part of the crop is affected by the brand, in mine, lying close to it, not a single ear so affected could be found.

The high character of the journal and its correspondent entitles this recommendation to attention. It is believed that similar steeps may have been used, though possibly not in the same proportions, in this country among our farmers. The method of obtaining the grain, by knocking off the choice kernels from the sheaf before it is subjected to the steep, may perhaps be new, and deserve trial.

In one of the numbers of the Prairie Farmer, we find a suggestion which seems also worthy of notice. The writer says that it may be well to save wheat that has remained good, from the fields destroyed in a great degree by rust or insects, for seed; and that perhaps some peculiarity in it may make it rust or insect proof. The hint is a good one; and in cases where the grain all around has so suffered while it has been untouched, it seems to indicate strongly that it is a hardier variety, or less susceptible of damage, than its neighbors. It is easily ascertained, and requires only a little more than ordinary care in selection, should it be found to be effectual.

The papers of our correspondents, in reply to the questions in the circular, and which are inserted in the appendix, No. 3, are so full of various suggestions respecting the varieties of wheat, modes of culture, cost of raising, and other particulars, while others, also, are embraced in Professor Beck's introductory remarks to his report of the analysis of wheat and flour, (appendix, No. 1,) that it may not be advisable to dwell further on the usual topics that have heretofore occupied this portion of our report.

A species of spring wheat is mentioned as having been introduced into the northern part of Iowa and Wisconsin from the Red river settlement, in the latitude of 45° to 51° north, which is recommended as worthy of attention. Its grain is said to be equal to winter wheat, and the crop is more certain, so far as it has been tried; and it is likewise thought by some that it would answer well further north. Among the seeds distributed from the office this year, are three kinds of wheat from Syria, brought out by Lieutenant Lynch. One of them is said to be from Kerak, the ancient capital of Moab, another from Damascus, and a third from Sharon, in

Palestine. It is hoped that some of these may vegetate, and thus their character and adaptation to our country may be ascertained. These varieties are all spring wheat. As other varieties, which are embraced also in the selection of this year from our own country, are a kind called Florence wheat, taken originally from the straw in which Greenough's statue of Washington was packed at the time the box containing it was opened, it is, therefore, undoubtedly of Italian, and probably Florentine origin. A good account is given of it as a fair, handsome wheat, that promises well. There are also a choice spring wheat, and the best white flint variety that could be obtained from the western part of New York.

Barley.—So little barley is raised, and, in many cases when it is sown, more for the purpose of a green crop or feed out to stock, that it seldom is noticed even in the agricultural journals of those States which furnish the largest portion of the whole crop of the country. We have, therefore, found it exceedingly difficult to obtain any replies to the questions relating to it in the circular. Usually it is said but little is raised, or passed over without the slightest notice.

To give anything of the history of a progress of such a crop, would be a vain attempt. The attention of some in the south appears to be turning to it as a valuable crop, and by individuals it is praised as equal to oats. This is a reason stated for its increase in certain portions of this section of our country.

The variety of the Cheltenham black skinned barley, distributed this year from the Patent Office, which has been obtained from England, if it should fulfil the promise of its growth in that country, described in our last report, pages 120, 121, may prove a valuable acquisition. It is described as remarkably productive, and yielding an excellent flour, and is said to have originally come from Abyssinia. How far it may have suffered in coming across the ocean, we cannot say; but as seeds undoubtedly do sometimes thus injure, the want of success on the first trial should not be taken as sure proof that it is useless. Possibly, too, it may require various trials to ascertain the precise adaptation of season for sow-it, and its best culture.

A change of it from such a climate and soil as that where it has succeeded in England, to a different one in our own country, may prevent its entire success, and yet, further researches or experiments might show that it is eminently fitted to take its place among our products if tried in a more appropriate time and place.

In distributing it, such directions have been added as could be obtained from the valuable English journals, where it is described and commended.

Two kinds of barley are likewise among the seeds received through Lieutenant Lynch from Syria. One of these is from Aingaddi, and the other is noted as being from Syria merely. We may, likewise, mention here, as a kindred grain, the d'houra or millet from Syria, which belongs to the same selection. If care is

taken, and the seed should not have been injured by transmission, possibly this grain may thus be introduced into the country, and prove of value as a subsidiary crop.

Barley is recommended very highly in the South Carolinian as a suitable crop for the south.

The writer says it is the only grain which will mature a crop in the south from the winter's moisture in the earth, and being originally cultivated in the hot climates of Arabia, Persia and Egypt, is admirably adapted to the climate of South Carolina.

It is subject to no disease save an occasional head being blasted, and no other insect but the Hessian fly attacks it. It has long been cultivated, he states, in Lexington and Newberry districts, and has produced 72 bushels to the acre, a product secured by the use of a compost of cotton seed, decomposed in the mule stables, and stable manure.

If sown successively from September to the month of February, it will afford a succession of the best soiling material as food for horses and milch cows from March to the 1st of June, and thus supplies that trying time, which is so disastrous to stock, with good nutritious herbage. It is thus fed off till the beards become too hard and the barley which is mowed before it rises into joint, will make a good crop of grain, while that which has not showed its heads, but merely jointed before being mowed off, will push up an irregular crop, which, when ripened, makes a capital summer pasture for hogs, just as they require extra attention. The writer also pronounces barley "a better food than corn for horses, mules, cattle and hogs, as well as furnishing the best of food for poultry, if ground into coarse meal, such as is commonly called *chops*," and mixed with cut straw or fodder, it is unrivalled for working stock. It fattens all animals fed with it with great rapidity.

While in New York, Indiana, corn usually commands fifty cents, barley rates at sixty cents per bushel. The writer declares further, that as much barley can be grown there on any soil as of Indian corn, while it is not so much labor to reap and thresh it out; and, independent of this gain in labor, there is a clear gain of 1·6 in the value of the crop over a corn crop.

Another writer in the Alabama Planter, concurring in the above statement there quoted, also remarks, that letting it go to seed, cutting it just as it is turning from the milky to the hard state, and curing it as oats, when cut up in a chaff cutter, with a small addition of chopped stuff, as a most superior feed for horses, mules and oxen; an acre is certainly superior to two acres of oats used in the same way.

Oats.—The oat crop experienced some of the same vicissitudes as did the other grain crops; and in parts of the country suffered from the drought. It is doubted, however, whether the injury was so extensive in regard to this crop as with respect to Indian corn. At least the notices which have met our observation do not warrant that conclusion. The crop is a very large one, both on account of its being cultivated in nearly every State, and also from

its being one which is raised everywhere in considerable quantities.

In many parts of the country its progress was rapid and successful. The season was favorable, a larger breadth was sown, and it was gathered in fine order. It is not thought necessary to go into much detail. In New England and the Southern States, the extremes, it is mentioned as having been good.

In New Jersey, part of Pennsylvania, New York, Maryland, and Ohio, complaint is made either of drought, or too wet weather. But in by far the largest breadth of land, the account is most favorable. In a few instances, the increase is rated as high as 70 or 80 or even 100 per cent , in some others 40 or 50 per cent., while in the most of the States the usual estimate is from 20 to 25 per cent. gain.

The ratio of decrease given is much less in these cases, where it is considered as having fallen off.

The cultivation of oats appears to be increasing in Michigan, and in some parts of Georgia and Alabama. The replies of our correspondents, inserted in the appendix, and to which reference has already been made, render it less necessary that we should go into detail. The quality of the grain in those cases where the crop did not suffer by the rains or the drought, is spoken of as better than usual; in some cases 15 per cent. better in this respect than the crop of the year previous.

Rye.—It is not easy to form any satisfactory conclusions respecting this crop in our country. Though limited to but a few States, yet even in these so little attention is paid to its appearance, it is so seldom noticed in the accounts of the growing crops, that the materials for the estimate are, at the best, extremely scanty. Nor do we find much additional aid in the replies of our correspondents; the general answer is, but little raised, some is grown but we cannot form any judgment, or something similar; so that we are at fault and left to gather up a few fragments and from them deduce our estimates, on which we cannot place equal reliance as on some other better known crops.

In glancing over the collection we have made from the letters of our correspondents, we have been led to the conclusion that in New England the rye crop the past year was more successful than the preceding one. In some parts of these States there was not so much sown; in others more attention was given to it. The maximum of increase in these States, as well as in Ohio and Pennsylvania, does not appear to have exceeded 10 per cent., except in a single county of Michigan, and another in Ohio, where it is high as 25 in the former and 40 per cent. in the latter case.

The amount, however, in both cases, was quite limited. In Massachusetts, our intelligent correspondent supposes that there was not more than three-fourths of the number of acres sown; but the crop was very fine. So in Vermont, it was a good crop; better than in 1847. In eastern Massachusetts a medium one. In the southwestern corner of New York 10 per cent. more, on account of the fly in the wheat for two or three years past; fully equal to last

year. In New Jersey, Pennsylvania, and Ohio, where noticed, it is thought to have been 10 per cent. better; the dry season being favorable to its growth. In some parts of Maryland it is thought to have been 20 per cent. better. It is also reckoned as an average crop in South Carolina; while in Georgia, Alabama, and Texas, somewhat more attention has been paid to it than in previous years. Thus in Alabama it is stated that it grows well on all lands in the region of Jackson county, and is a good crop every year. In Walker county, Georgia, the increase is placed at 10 per cent., as there was more planted. In Robertson county, Texas, it is thought to have been double the crop of 1847.

The Multicole rye which was distributed from this office some years since, is apparently gaining fast in Vermont. The editor of the Vermont State Agriculturist praises it; and, though his experiment was not as full as he could have wished, alludes to its name, and says that it stools out more perfectly than any other grain he ever met with. From 10 to 20 stalks grew from every seed that had vegetated, and one sort in particular, he says, numbered 31 stalks; each with a good head on it, the aggregate length of which was 14 feet 3 inches, and the number of grains 2,128. The heads of the entire crop, he further states, averaged about 4 inches in length.

In one of the replies to the circular from Vermont, we find this grain also alluded to thus: "The new kind (of rye) called the 'Multicole' has been introduced amongst us the past year, and is highly spoken of both on account of the quantity of the crop and the quality of the meal. I am informed that it produces, without any extra preparation of the land, from 40 to 50 bushels to the acre. It would appear to be well adapted for the higher northern latitudes in our country, and may yet prove a most valuable addition to their products."

Buckwheat.—This, again, is one of those crops so little raised as to render it almost impossible, without an actual estimate, to fix the amount even with approximating reliance.

It is highly commended by many as a manure for other crops, though, in this respect, not equal to clover. It allows, however, two such crops to be turned in a season, and on this account may prove a valuable aid to the farmer.

With respect to the amount raised for seed, there was a better crop than ordinary in some of the Western States, where it has not heretofore received much attention. It seems to be now more in demand, and, therefore, more is planted. In the interior, which did not suffer so severely from drought, the crop succeeded much better than along the coast.

This cause probably lessened the amount considerably in portions of the two largest of the States where it is cultivated—New York and Pennsylvania.

Taken altogether, therefore, it is doubtful if it was more than an average crop. In western Massachusetts, Vermont, western New York, in parts of Pennsylvania, and Indiana, and Illinois, it is placed, in replies to the office circular, at an advance varying from

10 to 25 per cent.; while in New Jersey, and other portions of New York, the drought is supposed to have lessened it from 10 per cent. to one-third of the whole crop; and in Iowa, the crop also was short, on account of the weather it experienced. The demand of this grain for market is quite limited, and, therefore, the inducements to engage in its cultivation are small.

Most of what is raised is consumed at home, and hardly awakens observation. In some of the replies from portions of the country where it is not raised, it is suggested that it would probably succeed well; but, till a greater demand exists for it, it is not likely that it will be attempted.

A description, called the blue buckwheat, has been mentioned as yielding better than the common species, besides, also, making superior flour. Some of this seed has been procured for distribution.

Maize or Indian corn.—This is always a large crop. It forms so much of a staple in many States, and is so relied on for the feeding of various stock, that there will be in every season a large amount sown. Probably the increased and still further expected demand of the previous year, operated to make the agriculturists of our country lay out a still greater breadth of their soil than usual in this favorite crop.

In some parts of the country we find complaints of the dryness of the spring; in others, that the weather, soon after it was planted, by its coldness retarded the early growth. Still, however, it seems on the whole to have been very promising, till into June or July; then a severe drought retarded its growth in many sections of our country, and great fears were excited lest it should be permanently injured.

This drought was very extensive, especially along the Atlantic coast. In the interior it does not appear to have been felt with so much severity. Happily, however, the rains commenced just as it was on the point of withering, and restored it in a measure, though no doubt a considerable diminution of the crop from what it would have been was occasioned by this drought. The crop, even with this drawback, was doubtless larger than ever before gathered, as the number of acres devoted to it had been so large. We will glance at the various stages of its growth in different sections of our country.

In the northern extremity of our country, Iowa and Michigan, western New York, Vermont, New Hampshire, Maine, Massachusetts and other New England States, the accounts represent it as promising in June and July.

The Iowa Farmer says, the corn crop is described as most promising. The other journals in the northern States use similar language, and throughout nearly the whole of this extent, in the replies to the circular, we have it estimated at 5 per cent., 10 per cent., 15 per cent., 20, 25, 30, 40, and even in some cases up to 75 and 100 per cent. advance on the crop of 1847. By others it is represented as having been a good crop both in quantity and quality; large; a large increase; first rate everywhere; a heavy crop.

Generally, the favorable season is assigned as one cause, and

"more planted" is also among the common ones. Thus, in New Hampshire, the early spring, it is said, allowed planting in good season and the great and steady heat in August brought it to perfect maturity.

In taking the next line of States, including those from Missouri, Illinois, through Indiana, Ohio, Kentucky, Pennsylvania, New York, and the other Atlantic States, as low as Virginia; we find the accounts both early and late, very similar, though perhaps admitting of more varieties, owing to the greater breadth of the Atlantic coast.

The drought of the latter part of the season of its growth more sensibly affected the progress of this crop along the coast than in the interior.

Speaking of southern Ohio, it is said in the Prairie Farmer, the cold dry weather that continued till the middle of June, checked the progress of corn, but the rain and warm weather that succeeded caused it to push up rapidly.

So the Indianapolis State Journal, of June, describes the corn fields as having never exhibited a fairer prospect, and states that they are one or two weeks earlier than usual. The dry weather is said to have been favorable, while the draining of the clay soil in many places has enlarged the crop by developing new corn fields which have been brought under cultivation.

Somewhat later, the Ohio Cultivator, mentioning the crop, says: The corn crop bids fair to ripen in good season, and the yield will be large.

The Lexington (Ky.) Atlas, speaking of a personal observation of the corn crop in the counties of Fayette, Franklin, Woodford, Shelby, Spencer, Jefferson, in the month of April, says it will be unprecedently fine.

In the earlier part of the season such seems indeed to have been the aspect of this crop very generally throughout the whole of this extent.

The New York, New Jersey, Pennsylvania, and Maryland journals allude to the forward and excellent state of the growing corn; but the drought was peculiarly severe in the eastern sections of the States of New Jersey, Pennsylvania, Delaware, Maryland, and eastern Virginia, bordering on the coast. During the months of June, July, and August, we find frequent allusion to this evil.

One says, if the present drought continues, we shall have but a sorry crop of corn; another calls it very unpropitious; and similar language is found in the various public journals. Yet, amid these discouragements, we meet also with declarations in the early part of August, in portions of these very States thus suffering, which mention that the corn crop will be overwhelming, and what is more singular, fears are expressed that the exceeding wet and rainy weather—nine days of constant or intermittent rains, &c.—may injure the corn in low swampy grounds, and hopes are entertained that in others it will prove of great benefit.

Looking at the estimated results of the corn crop in the same great sections of the country, as furnished in the replies of

our correspondents, we find a very general agreement that the crop was a large one, and an increase above that of the preceding year. The increase for Illinois varies from 10 to 15 and 20 per cent. more. Of Indiana, the estimates place it, in a few cases, at about 10 per cent., but most frequently as high as 20 and 25 per cent. increase. It appears to be the universal belief that more was planted. So in Ohio and Kentucky it is called a good crop, an increase; 5 per cent., 10 per cent., 20, 25, and even sometimes 75 per cent. is supposed to be a fair exhibition of the rate of the gain over the crop of 1847. The impression is likewise evident that a greater breadth of ground was allotted to this crop, the past year, than previously.

In the large States of New York and Ohio, the increase is regarded as having been very considerable; 15, and up to 25 per cent., is a common estimate of the gain over the previous year; and it is only till we begin to approach the coast in eastern New York, New Jersey, Pennsylvania, Maryland, Virginia, that we find a falling off of 5 per cent., 10 per cent., and in one or two cases rising as high as 50, or half the crop, from that of 1847.

The southern corn crop is much earlier, perhaps by a month or two months, than of those States we have before referred to. Its early promise was good. Even as far south as East Florida, it is mentioned in a local journal, on the 25th of May, that a large quantity of corn has been planted this year. In Alabama, the 6th of June, the corn crop is stated to look remarkably well, and to promise a fine harvest. In Louisiana, on the 27th of May, the weather is described as having been, thus far, the most propitious for the corn crop.

The State Gazette, of Montgomery, Alabama, early in June, says that the corn crop has been a little injured by dry weather in May; but the recent showers are stated to have revived it, and it promised well. In the interior, near Natchez, we meet, in the middle of May, with complaints of drought, which has impaired the prospect of the corn crop.

At a later date, about the middle of July, we find mention made in North Carolina of the recent rains, by which the corn crop has improved very much; and it is said, though the cool weather of April and May was unfavorable, yet it is believed there will be an abundant yield.

It would be easy to quote many other statements of a similar kind, but we will refer to the various reports in the appendix already mentioned, and merely gather up a few of the estimated results in the answers to the circular of this office.

The upper and eastern section of North Carolina is thought to have suffered a loss of from one-quarter to one-third of the growing crop. In South Carolina and Georgia, the increase is variously estimated at 10 or 15 per cent., while, in other cases, it is considered a fair average crop. In Alabama, there was a gain of 5, 10 or more per cent.; and the causes assigned are, that the spring was forward and favorable; the planting early, and the lands in fine order.

In Tennessee, though complaint is made of local causes, yet it is judged to have been a larger crop than the year before.

In Mississippi, it is said to have been good; while in some of the counties of Texas the gain is put at 50 per cent. on the previous year.

It is not deemed necessary to enter into further detail. Enough has been ascertained to convince us that though the early cold drought of April and May in some sections, and the still later and hot one of June, July, and August, in others, reduced the corn crop from what it would have been; yet, with all this lessening, it must be reckoned a heavy crop, much above the average of one year taken with another, and an advance upon that of the preceding one.

The appearance of it in many of the States where the drought was afterwards felt, as we know from personal observation, was uncommonly promising as late as August; the stalks vigorous and tall, while the ears appeared to be forming unusually well.

A variety of corn has been procured from Richard Rouzie, esq., of Tappahannock, Va., which is said to possess some excellencies. He states that it is the result of experiments for thirty-two years in a like number of varieties, foreign and domestic, and adds, "I consider it the most productive corn I have ever seen, yielding to the acre, more in corn, and to the bushel more in meal than any of the varieties experimented in. Some of my neighbors who have obtained seed from us say they think their crops have increased one-third over other varieties they have cultivated. The cob is generally red, the fangs of the kernel, therefore, partake of its color, and does not give it in bulk the pearly appearance the grain would have from a white cob. Some of our most intelligent farmers, however, value it more on this account, as they are of opinion that on the red cob corn matures more rapidly and perfectly than on white ones."

"You will perceive," he adds, "some of the ears are more remarkable for their circumference than length, whilst others are the very opposite; when obtained by me, I remarked to the gentleman from whom I obtained them, that I should separate the varieties; he advised me not to do so, stating that he had obtained them from different sections, and that they had never intermixed; this appeared to me incredible; nevertheless, I followed his advice, and in fifteen years' cultivation find them as distinct as they were when first obtained. In relation to the time of planting, I am of opinion that the first of April, for our latitude, would be early enough." On the subject of seed corn, Mr. Rouzie further says: "I would advise the strictest attention to its selection. By this, varieties will improve, and without, will certainly deteriorate. My plan has been, at shucking time, to select an ear of my choice, and to give it to the hands for sample; all such ears as they find in shucking are thrown aside for seed, and perhaps three or four times the quantity I need; this is kept till planting time, when I attend in person and make a farther selection from it, enough for my purpose."

Specimens of the above described corn will be distributed among

other seeds, to the members of Congress and prominent agriculturists of our country, in the hope that it may be a valuable addition to varieties already found in our country. It is probable, however, that the success may be greater in the southern than in the northern sections of the country, as being better adapted to the warmer than colder climate. A variety of corn, called the improved early Dutton, from Mr. Edes, of New Hampshire, and Oregon corn, will be embraced likewise in the list of those distributed. Of this improved early Dutton, Mr. Amasa Edes, of Newport, N. H., says: "It had been acclimated in the northern part of the State of Maine, and brought back here about ten years ago; and I have each year since that time saved and planted the earliest large ears, and, as I think, thereby improved it. One year I planted it the 27th day of May, and being a very warm season, it was ripe in ninety days from planting.

"It is prolific in ears, and one peculiar excellence of the corn is, that the stalks of the corn are very small compared with the size of the ear. In usual seasons, when it is planted about the 20th of May, it will be fit to harvest in one hundred days. It should be planted on a rich soil, because the ears, being large, require more nourishment than the small 8-rowed Canada corn.

It is mentioned by gentlemen from the south, that the gourd seed variety, when planted in the uplands, often becomes the flint corn. Specimens of ears exhibiting this change have been presented to the office; and while the gourd seed is a long, fine ear, the specimen of the flint, from similar seed raised in the upland, is a much shorter ear, and contains twenty rows, giving a large number of kernels to the ear.

Potato crop.—For some years past, it is well known that the success of this crop has seemed to depend on the point, whether or not it is affected by the disease that is termed the potato rot. In reviewing the history of the potato crop during the year 1848, so far as we have been able to ascertain it, we have come to the conclusion, that while in portions of New England and the middle States considerable loss was experienced from the potato disease, yet, on the whole, it was not as great as in the preceding year.

In the northwestern States, the evil prevailed more than ever before. The rot did not, probably, destroy as many potatoes in Maine, New Hampshire, Massachusetts and Connecticut, as in the earlier years of its appearance. Other causes, such as the season, lessened the quantity raised in some portions of these States, and the proportion of loss is variously estimated at from 20 to 50 per cent. Thus, in Essex county, Massachusetts, the crop is said to have been unusually light—not more than half a crop; this was not owing to the rot, as they were rotted but little. The blight struck them about the first of August, and a total failure was expected, but they turned out better than was anticipated. In parts of New Jersey, there was a larger crop than that of the previous year. In Pennsylvania, it is believed that the rot was not so severe as generally, but the discouragements of the former years may have prevented so many from being planted; there are, how-

ever, some cases where the increase is noted as probably 10 per cent. or more.

As we proceed westward in northern New York, the disease is said to have been worse than ever, and so in other portions more central and western of that State.

Yet in some cases, here too, we observe an increased crop, notwithstanding the injury sustained by the rot. Ohio, Michigan, Wisconsin, Iowa, Indiana, and Illinois, appear to have had the heaviest portion of the disease. In almost all the reports from these States, it is mentioned as prevalent with more or less intensity, in such language as this: nearly a total failure, 75 per cent., 50 per cent., down to one-quarter and one-third less than in 1847. In one of the reports from Indiana, it is stated that both kinds, the sweet potato, as well as the common or Irish, were affected by the rot, a fact which would seem to be very unusual, for in all the States in which the sweet potato is raised largely, we do not recollect of ever seeing any mention made of its thus suffering. We find no statement respecting the prevalence of the disease south of the Ohio river. Indeed from the returns thus far, we have not noticed it as extending lower down than Licking county, in Ohio. As it was very severe here, however, the presumption is, that it reached further south. It does not appear to have been felt in the southern States, and but little in Virginia.

The sweet potato crop in general, was fully equal to that of the past year, and in some cases larger. In Texas the potato crop appears to have suffered more than usual from drought, and in some counties the estimate is, that it was less by one-half or two-thirds than in the previous year.

Taking the whole crop through, the evidence furnished us as to its state is, that there was a gain on the crop of 1847—not large, but still enough to encourage the hope, that in a few years the disease will have spent its strength, and the potato crop may resume its former place of comparative productiveness.

We shall look with interest to the results of this crop furnished by the next census.

Potato rot.—As regards the disease, we do not propose to go into a lengthened review of the same. It may be proper, however, to place together such *new* facts as we have noticed since the last report.

One or two points seem to be well settled, that the best course to be adopted is to plant early, that the tubers may have time to become well formed and partially matured before the period at which the attack commences. This, as has been shown in former reports, varies from the middle of July to the middle of August. There appears to be a general concurrence, as to this, in the replies which have been furnished to the circular.

From Vermont, we are informed that the potatoes do best on grass lands, and old pastures ploughed in the spring, and with little or no manure. In Maryland, the remedy recommended is sound seed, early planting, and early securing them. In Essex county, Massachusetts, it is said the early planted, and least manured, succeeded best.

A striking fact, in relation to the preservation of some potatoes partially diseased, is mentioned in a report from Orange county, New York. It took place the year previous. Mr. W. H. Benton, of Goshen, it is stated, having lost most of his crop the year before last, the next year raised about thirty bushels Mercer's, upon a spot of rich, sandy soil. He put but one-half in his cellar, the most of which spoiled; and the other half he buried in his garden, and in the spring following, supposing that they had, of course, shared the fate of the others, he examined them, and to his great surprise discovered that they were sound, and in first rate order.

The question arises here, what was the cause of this preservation? Was it simply burying them, or was there some peculiarity in the nature of the garden soil, which thus operated to prevent the spread of the evil. The same fact is also said to have been realized by other gentlemen in the same neighborhood.

One of our correspondents, writing from St. Lawrence county, New York, says: "Potatoes planted as early as the middle of April on dry ground, are nearly free from the rot. I selected three acres of side-hill, broke it up in September, manured it with well rotted barn-yard manure, at the rate of twenty loads to the acre, last fall, ploughed and dragged it, and fitted it for planting in the spring, and planted it from the 8th to the 10th of April. While planting, the weather became so cold that I had one man cover as fast as another dropped the potatoes, lest they should freeze. The ground froze more than an inch deep. But the potatoes came up and grew well. We finished hoeing them the last day of May. They then looked finely.

"That very night the frost killed them down to the ground. Again they grew to about the same height as before, and again the frost killed them down. They were hoed the second and last time, the 20th of June. They appeared tolerably well, but not so fine as at first.

"About the 20th of August, the tops indicated disease and soon died down to the ground. All the potatos were fair, smooth and sound, except where the manure was not thoroughly spread. In such places there would be two or three rotten potatoes in a hill.

"I should not think there were three bushels of rotten potatoes on the three acres. The writer says farther, I attribute the disease to an atmospheric cause, and infer that my potatoes had so far matured, before the disease commenced, as not to be destroyed by it.

"But still it is difficult to account for the diminution of the crop. I had only two hundred bushels on an acre. On the same ground, with the same cultivation, five or six years ago, I should have expected a much larger crop."

There are some points in the above account which may claim our attention. Did not the manure in this case prove beneficial, because of the extreme cold weather? and had it been warm, instead of frosty, might not this addition have rendered the crop more liable to disease? 2d. How far did the dying off of the tops operate as a preventive against this disease? The loss of them may, perhaps, account for the diminution of the crop, or rather the cold

weather which cut them off may do so. To draw any decided conclusions from the facts, it would seem necessary that the experiment should be repeated in similar and also in different circumstances.

So many things concurred in this instance that it may be difficult to separate out the precise bearing of each particular to the general result. It is, however, a case of interest, and may well be placed among the facts which have been collected in such variety and quantity on this subject.

It is the same hard task now as it has ever been to reconcile all the recorded facts with one theory. Many have done speculating on the nature of the disease, perfectly convinced that the cause will never be discovered. Still there is an advantage in watching the progress further on from year to year, and it is hoped, in those places especially where it is but recent or has not yet appeared, its aspect will be carefully studied and the facts recorded, particularly those that are in any measure different from what has been elsewhere observed. It may be well, also, to notice if new phases of the disease shall be assumed in those places where it has been longest known.

In the Transactions of the N. Y. State Agricultural Society for 1847, we find an essay on the potato disease, by C. E. Goodrich, of Utica, in which the writer lays down these two propositions. 1st. The immediate cause of the potato disease is sudden and extreme alterations of weather occurring at critical periods in the growth of the plant. 2d. The remote cause is the exhausted energy of nearly the whole species, cultivated in Europe and the United States. These positions the writer endeavors to sustain, with much ingenious adaptation of facts and plausible argumentation. He has, since the publication of the essay, also expressed his firm conviction of the correctness of his conclusions, drawn from facts of after occurrence.

It appears to us, however, that like all the theories which have been broached, this, too, is liable to some serious objections.

It might for instance be asked, how is it that varieties of weather so directly contradictory should produce the same effect in different places? or, why the same sudden alternations of weather, which must more or less have long before existed, should have left the potato crop uninjured? or, if the period of the exhaustion of energy had not before been reached, how the potato introduced at such diverse periods into different countries should have so simultaneously had its energy exhausted? or, yet a harder question, why seedlings from the native country of the potato should have likewise suffered? These could not be comprehended under the same category of exhausted energy at one and the same period.

It is alleged, indeed, that the disease is confined to northern climates. But the writer seems not aware that in Europe this has not always been the case, as it was also felt in the southern countries of that continent. And it should also be recollected, that but very few, comparatively, of the common potato are raised in our

southern States. Of course there is but little material to keep alive any epidemic, and it has not ground upon which to operate.

The facts in relation to the alternations of the weather, which are relied on for proof, will be found to correspond only with the state of the case in particular countries or sections of the same country, while the directly contrary one existed in others. Let any one look over the vast mass of reports from Europe and this country, and try to square the statements of the weather with those noted by the author as having fallen under his experience and observation, and we believe he will be convinced it is a perfectly vain attempt. The writer speaks of a sandy soil as unfavorable; yet, in a vast number of statements, it is a sandy soil which is thought the best.

While he relies on the fact with him, that shading from the cold winds injures the vines, others adopt the directly contrary conclusion.

We might refer to the statements respecting the disease in France, by M. Payen, found in the report for 1845, page 666, and also to report for 1847, page 142, and Count Gasparin's opinion, on pages 147, 148, of the report for the same year, to corroborate some of the objections we have just stated to Mr. Goodrich's theory. Many other pages also of the reports could be quoted, in which facts are stated which do not tally with his views.

The more we read and study the accounts from all quarters, which have passed under our eye, attempting to attribute the disease with any degree of definiteness to some particular general cause, the more we become convinced that the objections are too numerous to allow of its adoption. The facts as to the appearance of the outward or internal structure of the sound or diseased potato, the changes which it more or less gradually undergoes, and the probable immediate causes of these changes in the individual cases, are interesting subjects of record, and may help us to understand the history of its almost endlessly diversified phases.

It is believed that probably a greater mass of material on this subject has been collected for these reports than at any other place in the United States; and our conviction has grown deeper from year to year, that the true cause will probably never be discovered. The researches made in Europe have been with no sparing of expense, and conducted by some of the ablest scientific investigators of the age; but the point of discovery seems only the further removed by the development of new facts as the disease proceeds from year to year.

In the Genesee Farmer for September, the following information respecting the disease of the potato is said to have been communicated by Mr. F. J. Betts, of Newburg, to the late meeting of the executive committee of the New York Agricultural Society. He says: I have this year planted potatoes in my forcing house, which ripened some three weeks since, and upon digging them, I found several entirely rotten.

I deem this fact of some importance in ascertaining the nature

of the disease, as it certainly refutes some of the theories in respect to it.

The house is kept at as even a temperature as practicable, without the use of artificial heat, and the ground is continually moist; neither sudden alternations of heat, therefore, nor sudden changes from dry to wet, can be the cause of the disease.

The soil is made 3½ feet deep, very rich from the admixture of well rotted manure, muck and shell marl, and limed very heavily.

Similar facts have heretofore been observed in Europe respecting plants raised in conservatories, and where an even temperature was maintained."

In the American Farmer for September, it is stated that in Denton, Maryland, on the borders of the Choptank, the potato rot is unknown. The land there is high and sandy, and the writer seems to suppose, that the high sandy soil may be the cause. Unfortunately, however, in other counties the disease has prevailed in such soils.

Among some of the new observations to which we may refer, we translate the following from some of the German journals of the highest authority:

Thus in Lloyd's Austrian Journal, we find it stated, that "The Russian Journal of the Minister of the Interior, contains a pretty circumstantial account of the potato disease so far as noticed in Russia. It had already, in previous years, attacked the crop in Courland, Livonia, Esthonian, and the governments of Mohilew, and this year (1847) has extended itself over the whole northwestern portion of Russia, the government of Livonia, Esthonian, Kowno, Wilna, Witepsk, Minst, Mohilew, Volhynia, Kiew, Pskow, and St. Petersburg. In Livonia, the plants were destroyed in a state of blossom, in the middle of June; the stalks withered, the leaves dried up, and notwithstanding the warm weather, they were affected as if after a cold night. On the contrary, in the government of Mohilew, up to the 15th of August, (old style,) and so to the end of August, no sign was seen of the disease, but then it broke out suddenly and spread itself daily." Here we have, therefore, two different kinds of processes, which only render the matter so much the more inexplicable. The admonitions how the potatoes should be managed in seeding, and the attempts at explanation are as useless here as elsewhere.

In an article in the Central Blatt of the Bavarian Agricultural Society, for March last, we find the following remedy by Dr. Reinsch. After describing the internal structure of the potato, he says: "This degeneration of the potato, depends on nothing else than a laceration of the cellular bags, which contains particular substances, and upon the mixture of heterogenous substances produced thereby, which cannot thus mix together with mutual decomposition. This affects not only the tube, but the whole plant, as is exhibited by the withering and rotting of the stalk, producing of bad seed, &c." He illustrates his views by supposing in a vessel a number of little silver or glass balls, the latter of which, if filled with nitric acid, and then kept still, are

preserved for years, but if the vessel be shaken so that the glass balls should break, then the nitric acid becomes mixed with the silver balls and these are rapidly dissolved, according to the well known phenomena of decomposition. Every potato may thus, he says, be considered such a vessel, in which in place of little silver balls, millions of grains of starch meal are preserved, near which are nitrogenous substances enclosed in little bladders, as well as albumen, &c., and probably cells which contain vegetable lees.

The editor of the journal above mentioned, from which we have translated this view, observes in a note appended: "We will barely remark, that the fact of the original cause of the laceration of the cells, (the thinness of the cellular walls and the excessive filling of the cells,) being now so abundant after more than a hundred years' cultivation, is the first etiological point of importance which, above all things, deserves to be most closely examined."

Different remedies continue to be proposed in Europe, among which may be mentioned those by Mr. Van der Trappe, of Wessel Prussia, and the more celebrated one of Dr. Klotsch. The mode of cultivation adopted by the former gentleman has not been published. He asserts, however, that he planted one-half of a large pile of potatoes the usual way, and another half according to the plan which he had discovered.

The potatoes cultivated in the common way were diseased, and the leaves withered and dried up at an early period, while those which were managed after his new plan, were successful and continued green till late in the autumn.

The tubers also proved sound, and the yield was large. The experiment was so decisive that a committee was appointed to examine into the facts, which, it is stated, they have published officially, and recommended to have the secret made known.

The method of Dr. Klotsch has excited more attention, both in his own country and elsewhere. His high standing as the keeper of the royal herbarium, and his reputation as a distinguished vegetable physiologist, together with his success, seemed to entitle his opinions to more than common weight.

The minister of the interior of Prussia referred the question to the College of Agricultural Economy, by whom it was again referred to their president. Dr. Klotsch made a full exposition of his method to this gentleman, and he speaks of it in the following language, as we find it in Dr. Von Lengerke's Annalen, vol. XI., p. 197:

"This method is not a merely fortunate chance, but Dr. Klotsch has been led to it by his general opinions on the subject of vegetable physiology. He already employed it in the year 1846 successfully; and in a renewed experiment, made both on a larger scale and comparatively this year, (1847,) as he asserts, he obtained a more decided result." He adds, "Dr. Klotsch has a high reputation in Germany as a botanist and vegetable physiologist, and in England is quoted as authority. He is a very clear, sensible, and prudent man. His proposal guarantees every possible security," &c.; and closes by saying that he is inclined to regard the method as an effectual one.

It is stated that the college concurred in the report of their president, and the trial was undertaken. The report of the experiment we have not yet seen. The following is the method of cultivation recommended by Dr. Klotsch, which we find also in the same journal. We give here only the substance, reserving the full description for the appendix, if thought best to insert it.

He sets the tubers as usual, and in the 5th, 6th, and 7th week after the setting of the same, and 4 or 5 weeks after the planting the germs with the roots, at which time the plants may be 6 to 9 inches in height above the ground, pinches off the end points of the branches or twigs, say for half an inch from the top; and this course is to be pursued on all the branches and twigs in the 10th and 11th weeks. The time of the day to do this is not mentioned.

This, he asserts, will check the too great development of stalk and its branches, and by increasing the nutritive matter increases the number of the branching stems, and also the ability of the root, &c.

It might seem, from the high character of the discoverer, that this method would prove a remedy to the evil. We find, however, in the London Gardener's Chronicle, of September 2, p. 590, this mode has also, in some cases, proved unsuccessful. In a communication there, signed M. J. B., and supposed to be from Rev. M. J. Berkley, the distinguished mycologist and warm advocate of the fungus theory of the disease, it is said, "Mr. Wainwright of Rushton, Northamptonshire, has tried Dr. Klotsch's plan of topping the potato crop, and gives the following as the result of the experiment:

Row in which the leading shoots were cut off: Produce, 70 lbs.; sound, 14 lbs.; diseased 56 lbs.; diseased when dug, 14 lbs.; after being dug, 42 lbs.

Row in which the leading shoots were untouched: Produce, 86 lbs.; sound, 23 lbs.; diseased, 63 lbs.; diseased when dug, 11 lbs.; after being dug, 52 lbs.

Giving an excess of diseased tubers in the former instance, in the proportion of 344 to 317. The produce, however, in the former case, was of the finer quality. The results of two weighings give 98 lbs. of sound to 111 lbs. diseased, and 46 lbs. sound to 328 lbs. diseased.

In one of the communications made respecting the potato disease in Scotland, the mode in which the first appearance of the disease on the stem shows itself, is thus given:

The writer says: "very little rain having fallen, the fields are exceedingly dry, and though the putrid like spot on the stem is seen, yet the leaves seem most affected; and this is not occasioned by the friction of one on the other by wind, nor is the general blackening caused by frost; it comes often in the centre of the leaf, and thence extends outward, both surfaces being affected. When it first appeared it spread rapidly for two days; after that two weeks elapsed with almost no apparent increase; a further increase of the influence was again apparent, and during other two

days the later varieties became slightly affected. During these last 8 days almost no increase has been visible; but the tubers of those first attacked are becoming affected. A dry clear air, with the soil poor, dry, and porous, with the situation and the lie of the ground open and exposed, appear to offer the greatest obstacles to its progress."

In the London Gardener's Chronicle, for 16th September, the following facts are given in respect to the utility of earthing up potatoes, as a means of preservation from disease. The writer says: "I put in hillocks, on the 11th of February, four whole potatoes, (Farmers' Glory,) a yard and a half apart, 9 inches deep, on a little stable manure. As soon as the haulm appeared, (about the middle of April,) I began earthing them up, and continued to do so until the end of June.

"They were screened on the north by a hedge, and on the west by some Jerusalem artichokes and a hedge open to the east and south. The soil stiff, rich, and clayey. About three weeks after the leaves began to show blotches, and to day when dug the haulm was entirely perished. I ought to have stated that only three of the four set came to anything, some sheep having eaten off one. The produce of the three potatoes was 18¾ pounds, many of the potatoes weighing 1 pound and a little more—not one diseased. All my other potatoes have been very bad."

In appendix, No. 4, will be found a few additional papers on this subject.

Hay crop.—The amount of hay gathered in many of the largest States by no means affords any full criterion of the quantity of grass consumed for feeding cattle.

In the western States especially, with their vast prairies, comparatively small crops of hay are reported.

The stock consume what is turned to hay elsewhere in grass. Were this to be added to the tons actually cut and dried, it would make an increase of many millions of tons. This is important to be kept in mind, as we give a slight survey of what may be called the hay crop proper.

While in some of the States, where attention is paid to this product, there appears to have been a partial lessening of the amount on account of the cold dry spring, in others again the nature of the season is assigned as the reason for its advance over the crop of 1847.

In the New England States the crop, as a whole, was probably better than in the previous year. In Maine, although complaint is made of the clover being much cut off, yet the gain of the whole hay crop is set at about 10, to 15, and even 20 per cent. The same was the case, too, in New Hampshire. In Vermont, in general, the crop is estimated at an increase of some 10 per cent., and even in cases where it is otherwise, as in Windsor county, where was a slight falling off from the previous year, yet it is described as being a very good crop. In Massachusetts, along the coast, the reports are favorable. In Essex county, it is spoken of as unusually good—25 per cent. above the usual crop. In Plymouth county, 15 per

cent. more than in 1847. In the western portion of the State, in Berkshire county, our correspondent says that the crop was a short one compared with the average. Still he judges that there was an increase over the crop of 1847 of one-quarter or one-third, owing partly to new stocked meadows and the favorable weather in May which was cold and wet.

In the upper part of the State of New York, in St. Lawrence county, the estimate is less favorable, and it is supposed to have been 7 per cent. less. The reason assigned is, that the early part of the season was so dry as to retard the growth of grass; those who cut theirs the earliest, had the lightest crops; so in Jefferson county, it is said that this crop was extremely light. In Suffolk county, Long Island, the rains are mentioned as the reason for the increase of 10 per cent. given. In Sullivan county, it gained 25 per cent. The same is the case, in regard to Chautauque county, where the estimate is carried as high as 35 per cent. over the crop of 1847.

The hay crop is pronounced to have been less than the usual crop in Madison county, in the central part of the State, and also in the western one of Niagara. In the latter, it is supposed to have fallen one-third from the crop of 1847, by the drought. In the former case, our correspodent says, "Our hay crop has been a rather short crop for the last two years, owing to some cause not exactly understood. The grass will start early, and look fine and promising for a short time; but when it should head out, not one in ten make their appearance; this last season has not been so bad as that of 1847, and the crop has been all of 25 per cent. better." In Seneca county, it is said, the favorable state of the atmosphere during the spring months and the season of the hay harvest, enabled the farmers to secure more than an average crop of hay, probably one-third more than the previous year. An annual loss is incurred on this crop by the too late ingathering of Timothy hay. As the grass ripens here generally at the period of our wheat harvest, it is cut too late, that is, not until the seed has nearly ripened, and when the straw and leaf has parted with most of the nutritious power. In New Jersey, the supposed advance, ranges from 20 per cent., up to $\frac{1}{4}$ and $\frac{1}{3}$ of the crop.

There would seem to have been a more than average crop in Pennsylvania, and in cases where the drought greatly injured the hay crop in 1847, the gain of 1848, on the former year, is placed at 30 per cent. In those portions of Virginia, where it is noticed as among their crops, the replies we have received place the gain on the former year at from 20 up to 25 or more per cent. The good season is assigned as the cause of the better crop. The same was the case in Ohio, Kentucky, and Tennessee. In the first of these States, the supposed increase of the hay crop of 1848, is differently fixed at 5, 10, 15, 20 per cent., and as high, in some cases, as 25 per cent. The season is noticed as having been much more favorable. With this agrees, also, the summary of the abstract of returns to the Ohio board of agriculture. On examination, we perceive but three counties where hay is mentioned, in

which the average product per acre for this year is not above that of the average of the five or six years. In Indiana and Illinois, so far as noticed, it is favorable to an estimated increase. In some cases, owing to more having been sown, the gain is put as high 50 per cent.

Michigan yields considerable hay, and from the reports of this year the crop is advancing, as it is pronounced to have been a fine crop, excellent, 20 to 25 per cent. more. In Iowa, though the drought in the early part of the summer affected it in some parts of the State, and rendered it light, still there was a very fair crop, on account of the increase of meadows, and the gain is put at 10 per cent.

In some of the States, as for instance in portions of Ohio, while the quantity is thought to be less, the quality is much better; the clover, especially, was started early, and ripened in season for a good yield.

It would seem as if some valuable addition might be made to our stock of native grasses from California. In his work entitled, "What I saw in California," Mr. E. Bryant says of the grass of that country: "The varieties of the grasses are greater than on the Atlantic side of the continent, and far more nutritious. I have seen seven different kinds of clover, several of them in a dry state, depositing a seed upon the ground so abundant as to cover it, which is lapped up by the cattle and horses, and other animals, as corn and oats, when threshed, would be with us. All the grasses, and they cover the entire country, are heavily seeded, and when ripe, are as fattening to stock as the grains which we feed to our beef, horses, and hogs."

Hemp.—In giving our estimate of this crop in the last year's report, we relied on the information derived from an intelligent source from the west. We see, however, that the editor of the Western Journal, published at St. Louis, inclines to the opinion that our view of the quantity was erroneous, and indeed too large an amount was assumed.

There ever has been a considerable diversity of opinion among good judges in the western hemp growing States respecting it, and whatever be the quantity estimated, it would doubtless find some to differ from it as too high or too low. Judging from the best information we have been able as yet to obtain, the hemp crop was lighter in 1848 than in the previous year.

In some portions of Kentucky it was equal to an average crop, in others fell short of it. Thus the Lexington Atlas, in August last, speaks of it: "In the county of Woodford the hemp crop will be nearly an average one, while in Fayette, Franklin, Shelby, Spencer and Jefferson, it will fall far short.

Our correspondent at St. Louis states, as the result of his inquiries, that the crop of 1847 was about 51,000 bales, or some 7,000 tons, and the crop of 1848 is estimated as about equal in quantity, though the quality it is said will not be so good; thus showing a deterioration for the last three years successively." The Lexington Atlas, in August, quotes from the letter of an intelligent farmer

from La Fayette county, in Missouri, who says: "Although there was nearly twice as much ground sown in hemp this year as last in this county, yet we really do not think there will be near so much hemp made. I have seen some pieces of hemp that positively will not be worth cutting."

As Kentucky and Missouri are the two States from which the largest portion of the hemp crop is derived, it is evident that we must set down the quantity raised as below the average crop. We shall be obliged, however, to await the result of the next census before we can ascertain, with any degree of precision, what the amount is of hemp raised in the United States.

By the following description of a new mode of preparing cordage, it would appear that one great difficulty which has existed respecting the application of American hemp has been obviated, and if the account proves correct, it is probable it may create a better market for this product of our soil. We had the promise of some articles on the subject of hemp which have not yet reached us. They may, however, be in time for a place in an appendix, and if so, will be there inserted.

Indestructible cordage.—The Cincinnati Gazette of Monday, speaks as follows of the new article of cordage manufactured by Messrs. J. T. Crook, of East Maysville. We are glad to see it attracting the attention of business men at important points, and sincerely wish the enterprising manufacturers the most substantial success they could desire.

"From the manufactory of J. T. Crook & Co., at Maysville, we have received a sample of cordage, manufactured by them, of rotted hemp, so kyanized by the use of antiseptic substances as to render it, they assure us, indestructible when exposed to the weather. Cordage, prepared like this, has been buried in a fungous heap, filled with decaying vegetable matter, for five years, without showing the least sign of decay. In respect to the manufacturing of cordage, they say:

"'In preparing this cordage in this country we are compelled to use the *unrotted* hemp, since it is an established fact that antiseptics will not prevent the decay of vegetable matter, *when decay has actually commenced*, as is the case of our dew and water rotted hemp. The Russia hemp, in not being carried to the fermenting point in rotting, is not, like our water-rotted hemp, affected by decay, and is capable of being kyanized like the unrotted hemp, as has been successfully done in England, by the use of suitable antiseptics.

"'The comparative value of different sorts of hemp as it regards durability, is easily and speedly tested by any one, since nearly all kinds are very short lived when exposed to causes favorable to decay. The Manilla will last some four or five months as used in the summer season upon our steamboats—the *Sisal*, which is often sold in the west as Manilla, will not last much more than half as long—the Russia hemp, when kept moist and warm, will lose its strength in about three weeks—the American water rotted in two weeks, and the dew rotted in from five to ten days. The unrotted

hemp, without being kyanized, will not last longer than the dew rotted, and will even show more signs of putrefaction before losing its strength.

"'You will perceive that the color and appearance of this cordage is similar to the Russia or water rotted hemp. The strength is greater than either, while it is not '*frayed down*' like Manilla, by friction. Other specimens of various sizes may be seen at the warehouse of Campbell, Metcalfe & Co., Main-street, near Columbia, who are our agents in Cincinnati for the sale of our cordages.'"

A process for preparing hemp is believed to have been lately discovered, which, should it prove all it promises, may yet render this crop of much greater value than it now is in this country. Mr. C. L. Fleischman, to whom the country is indebted for his able report on German wool and other articles of interest in Germany in the last year's report, and for the interesting one on sugar, to be found in the appendix of the present report, believes that he will be able to accomplish the rotting more successfully and in a much shorter time than is now allotted to it, besides obviating the difficulties which have existed. He is about to take out a patent for the purpose, having entered his caveat, and intends to prosecute experiments on the subject. It would be a good appropriation were the Navy Department to have a course of experiments tried by Mr. Fleischman for this purpose, as his discovery, if it succeeds, will doubtless relieve the country from the necessity of importing hemp from Russia.

Flax.—Taking the whole country, considerable flax is raised; indeed, much more than a person who has not examined the returns of the census, or the estimates in various counties of some of the States, might be willing to admit. Such a lessened view we know to have been the impression on the mind of the editor of the Western Journal, published at St. Louis, who expressed his doubt that even 1,000 tons of this crop is produced in the whole United States.

Yet, in the single State of New York, as appears from the returns of the State census of 1845, not less than 46,089 acres were devoted to flax, producing at least 2,897,062½ lbs. In the Ohio Cultivator, also, for 1st of September, 1848, p. 134, we find the following statement: "A highly respectable and intelligent gentleman, residing within forty miles of Cincinnati, stated a few weeks since that 100,000 bushels of flax seed were raised last season in his county; and that nine tenths of the stalk was thrown away, the seed being got out by threshing machines, or the tramping of horses, either of which modes of course destroys the fibre. This seed produced the growers about $65,000, and had the lint been saved, properly prepared, and sent to Liverpool, or even New York, an additional product, to the value of at least $150,000 above all cost, would have been the result; and this is only one out of some twenty counties in this State where flax is extensively grown."

This is only a proof how little aware persons are of the productiveness of our crops, who measure them simply with reference to

some particular product in their own vicinity. The more extended our means have been of getting acquainted with the various results of the years' harvest throughout the whole country, the more decided is our conviction that the full amount is hardly ever assumed as the basis of calculations by those who take only some one element of estimate, and whose knowledge of every section is in a great degree limited.

In almost all cases where we have been led to revise our estimates, in consequence of their being so disputed, we have had our belief strengthened that we are nearer to the truth than those who have more hastily drawn up their conclusions.

In appendix No. 5, will be found an interesting account of East India hemp, communicated by a missionary in that country to the Louisville Journal, from which we have taken it.

The same difficulty to which we have referred as belonging to hemp is also found to operate against that enlargement of the flax crop which would otherwise undoubtedly take place; we mean the preparation of it for the market. If the best process could be discovered for rotting it, or if it could be converted into fabrics cheaply without rotting it, then, no doubt, it would soon become a favorite crop in many sections of our country. A progress seems to be making towards this desirable result, and it may be hoped that the time is not far distant when both of these products will figure largely in our markets, as well as become articles of export, and thus the "*fine linen*" of ancient times be equalled by the greater abundance of our own more recently settled land.

In the former report, (1847,) an extract was given on page 165, from Professor Johnston's remarks on flax, containing an analysis of this plant. An error occurred in transcribing or printing, which it is deemed best to rectify here by an accurate quotation of the figures from the English journal whence it is taken.

Composition of the ash of the stem of the flax plant.

	Heerstert.	Escamaffles.	Haume.	Holland.	Near Dublin.
	Courtrai district.	Courtrai district.	Antwerp district.		
Potash	7.697	22.857	22.30	18.41	9.78
Soda	19.186	....	14.12	10.91	7.70
Chloride of sodium	8.213	[illegible]	4.59	5.65	3.99
Lime	15.279	16.483	18.33	18.37	12.53
Magnesia	5.446	3.352	3.93	3.02	7.79
Oxide of iron	4.301	1.523	1.10	2.36	
Alumina	0.444	0.438	0.72	1.44	6.08
Oxide of magnesia	trace.	trace.	trace.		
Sulphuric acid	6.280	6.714	6.53	9.68	2.65
Phosphoric acid	11.206	11.802	8.81	11.06	10.84
Carbonic acid	20.599	25.235	16.38	13.75	16.95
Silica	3.056	3.409	2.08	5.33	21.55
	100.007	99.954	99.99	99.98	99.46
Per centage of ash	4.237	5.454	5.65	5.15	5.00

Tobacco.—For some years past it is believed, so far as can be ascertained, there has been a comparative falling off of the tobacco crop of the country. The reason of this is to be found probably in the fact of the exhaustion of the lands devoted to this product in the largest tobacco growing regions of the Atlantic States; especially of Maryland, Virginia, and South Carolina, while there has not been, as in the case of the cotton crop, sufficient additional lands in the other parts of the country brought into cultivation to supply the deficiency. Still it is undoubtedly true, that the attention to this crop in Kentucky, Ohio, &c., has had some influence likewise to lessen the profit of the same in the former States.

This reason we find sometimes assigned in the replies from the tobacco growing sections of Virginia. It may also be that some of the attention formerly here given to tobacco has been directed to the breadstuffs, especially during the call for them from abroad, and in consequence of the injury sustained to the tobacco crop by the worm for two or three successive years. But whatever be the cause, it would appear from the answers of our correspondents there has not been that increase in this product which there has been in many others, and in many cases a positive decrease must be allowed. Whether the whole crop will be found to fall below that of the census of 1840, may perhaps be questionable, for should the returns be taken with greater accuracy, it is not unlikely more will be reported than before, as no doubt portions of the crop may have escaped notice. There still continues to be some attention paid to the raising of tobacco in Massachusetts and Connecticut, and, though less than in these, also in the State of New York.

It is probable that on the whole the quantity raised is increasing. Still the amount forms but a very small item either in the general aggregate of this crop or in comparison to most other crops.

In the great tobacco growing States along the Atlantic the crop is believed not to have been equal to an average crop in good years. In Buckingham county, Virginia, the decrease is thought to have been twenty per cent.

A correspondent speaking of the tobacco crop of Virginia, remarks: "The crop of tobacco made in Virginia in the year 1847, was far below the average, being only about 36,000 hogsheads, but this was not owing to the season, but principally to the price of corn for exportation, which induced the planters to reduce their tobacco crop and increase that of corn.

From the best information I can obtain, the tobacco crop made this year in Virginia will not much exceed that of 1847, as the season for planting was unfavorable, and the crop consequently late. I suppose the quantity made will not exceed 40,000 hogsheads. The present year there was a plenty of rain for planting tobacco in May, but the month of June was dry, and consequently much of the tobacco was planted in July, and therefore the crop will be less than an average one. From this it would appear that the estimate of the year 1847 proved to be too high.

We have followed the conclusions of our correspondent, whose means of knowledge appear to be good, preferring to fall short

rather than to exceed the amount. Taking the census as the basis, we suspect he is too low in his estimate. The amount inspected in 1847, as last reported, was in Virginia more than 51,000 hogsheads.

In Kentucky, complaint is made of the state of the weather as affecting the tobacco crop. Thus the Bowling Green Intelligencer says, on the 9th of August: "Owing to the long continued wet weather, the growing crop of tobacco in this section of the State has suffered materially, and should the rain continue a week or two longer, the crop would almost all be lost."

The crop in Greenup county in the same State, it is thought, is about the same as in 1847.

In Tennessee the accounts vary, some making the crop about equal to the previous one, except in the quality, which is stated to be not so good in consequence of the excessive rains in the summer, while in other sections it is said to have fallen off some twenty-five per cent. from the want of plants and the absence of early planting seasons. Judging from the information obtained from Ohio, Indiana, and Illinois, where, however, the crop is not a prominent one, the same vicissitudes prevailed. In a few instances the amount raised is reported as on the increase, as more is planted; in others the quantity was probably about equal to that in 1847, while in others there has been a very considerable decrease. The bad season is assigned as the cause of that ill success, and so great is the falling off in Morgan county, where 600 hogsheads were raised, owing to the bad season in planting in '46 and '47, the crop has been cut down it is said from 600 hogsheads to 40 or 50.

Attempts have been made to procure some genuine Cuba or Havana tobacco from Cuba, and it is hoped it may yet be received, but no intelligence has yet been had respecting the commission.

During the past year, by a letter from John P. Brown, esq., U. S. consul at Constantinople, we have been advised of the seed of several samples of Persian tobacco being on the way to the office. Mr. Brown, in his letter, says, it is called in the east, *tombakkee*, and suggests that probably tobacco has derived its name from this species. His design in transmitting the seed was that experiments might be made on it in some of the tobacco growing regions of this country, and he observes: "I was struck with the quantity of tombakkee carried through Erzeroom, visited by me a year or two ago, from Persia to Turkey, and procured at Trebizond, its place of shipment on the Black sea, the following items on the subject, which I believe, may be relied on:

"Was shipped at Trebizond from Constantinople, tombakkee:

In 1846, 18,756 bales, weighed 60 to 70 okes, value from 8 to 10 cents per oke.
1847, 17,642 " " " " " " "

"The oke is $2\frac{3}{4}$ lbs., and reckoning the bale on an average at £6, or $30, an idea will be formed of the amount of trade in this article. The best kind of tombakkee is raised at Chiras in Persia, and retails in this city (Constantinople) at from 25 to 40 piasters, at $1 to $1 75, the $2\frac{3}{4}$ lbs. It is used entirely for smoking in the Marquilay or water pipes of the inhabitants. The seed which I

have the honor of sending you is, however, not from Persia, but from Egypt, where it is successfully planted on the estates of the viceroy, Ibrahim Pacha. The preceding amounts quoted, are only what is shipped to this place; but the tombakkee is carried inland to all the greater towns in the interior of Asia Minor."

This seed, amounting to some three pounds, has been received and distributed among those prepared and sent abroad from the office, through the members of Congress over the whole country. Another valuable variety also, comprised in the same distribution, is some choice seed from Latakia, Syria, and brought home by Lieut. Lynch. It is hoped that these seeds will be successfully cultivated, and should this be the case, they will doubtless be considered a most valuable acquisition by our tobacco growing States.

Cotton.—The cotton crop, though one of great importance, embracing as it does the interest of so many States and affecting the markets at home and abroad, is yet one respecting which, at this early period, it is exceedingly difficult to form very accurate conclusions. Even those who reside in the very midst of the great depôts of the product do not agree respecting the quantity that may eventually be included in the gathering for the year. But in addition to what is reported as actually brought to market, the census undoubtedly contemplated the obtaining the amount raised and consumed at home on the plantations and in the vicinity. Doubtless there are many small proprietors who raise a small quantity each for his own family use, and these small amounts so multiplied form a very considerable aggregate which should have a place in the general estimate of the crop. We have no means of ascertaining the proportion this bears to the whole, but it may be sufficient to occasion some variation from the estimates which are based solely on the amount received at the seaports, in the way of trade.

The early prospects of the cotton crop appear to have been favorable. This continued to be the case through the growing season. During the summer, anticipations were entertained that the amount raised would exceed that of any year before. Thus it is stated early in August in one of the journals: "A planter says that he has been in Alabama thirty years, and never yet saw such a cotton crop as the present promises. He will make a half a crop over the average, and it is the same with his neighborhood."

About Georgetown, S. C., too, it is said the rich heads are large and promise well. A similar report is made in July of the crop in other portions of South Carolina.

Farther to the west more complaint was made; and about the middle and latter part of August we meet with notices which are less favorable. Heavy rains are mentioned as injuring the crop. Thus it is stated, August 17: "The accounts from the interior of Alabama are not so favorable for the cotton crop. The rains have been heavy, producing vermin and choking the plant." Again, August 24, "the late immense quantity of rains at this season," says the Alabama Journal, "have, we learn, seriously affected the prospect of the cotton crop. The low cotton lands are flooded."

The cotton crop in Baker county, S. C., is much injured by worms, so that not more than two-thirds of a crop will be secured.

Again, in September it is said, the prospect of the cotton crop in Greene county, Alabama, is not so good as it was three weeks ago. The Greensboro Beacon says, that within the last fifteen or twenty days the boll worm has appeared in such numbers as materially to change the prospect. In some places, we have information that the crops have been cut off one half. A writer from Clarke county, in the Alabama Planter, alluding to the injury by the boll worm, says: The worm here, called the boll worm, is correctly the "form worm," and its attacks are in the bud of the form or square. There is another worm known as the boll worm, which attacks the green boll when maturing and destroys its fruit; but no worm of this description has made its appearance in this section, nor will it do any injury to the crop. He goes on to observe further in reference to the prospect: If I am not disappointed, we shall receive in Mobile for 1848 and 1849 the largest crop yet sent to our port.

In my travels, I have met with a number of gentlemen from different parts of the State, all of whom are of opinion, that if the season continues favorable, the yield will be larger than that of any previous crop.

The editor of the same paper, after speaking of preceding ununfavorable accounts of injury from the worm and excessive rains, observes: "In some sections, we are inclined to think that the accounts have not been exaggerated, but at the same time we have not adopted the opinion current in some quarters, of a short crop in the aggregate." He also speaks of the arrivals of the crop and prices, as indicating that the prospects of the growing crop are satisfactory, "and leading them to the belief that the yield will be much larger than last year."

At a later date, on the 12th of October, a letter from Sumter county, Alabama, thus speaks of the cotton crop in that region: "The unusually favorable season will cause the cotton crop to exceed the expectations of the most sanguine a few weeks ago. I am beginning to think that it will be a fair average; and you know, from my former guesses, that *my* opinion is worthy of regard, because, for the last three years my estimates, made as early as the middle of November, have been every year within less than 3,000 bales of Mobile receipts, except that after the great flood last year in December. In consequence of that calamity, I amended my estimates by 30,000 bales."

The Natchez Courier, Mississippi, remarks in reference to this crop in September: "On the whole, the accounts are very flattering, although, in many places, the boll worm has done, and is doing considerable damage. All our planters now fear, is a continuance of rainy weather.

"Clear and sunshiny weather is all they require to make an excellent crop."

In Tennessee, while it was thought, about the last of November, at Nashville, that "the present crop will not be equal to the last in quantity;" it is at the same time asserted, that it will be vastly

superior in quality, "and this is attributed to the fall being remarkably dry and favorable for picking, and the staple is also pronounced to be of good length, clear of stain and leaf."

The reports which we have received, respecting the cotton, we regret to say are not numerous enough to afford any very sufficient data for estimates. This is owing to the fact that a large portion of the crop remained ungathered at the time they were made, and as so much depended on the weather to be experienced, great variations might take place. In the upper districts of South Carolina, it is thought to have exceeded the crop of 1847 by 10 per cent., in consequence of the former season having been too wet. In Newberry districts of the same State, the gain is placed as high as 25 per cent. In Lancaster district, 5 per cent. more, as the season was favorable till July. In Charleston district, about 20 per cent. more, owing to the drier season. In Georgia, Hancock, and the adjoining counties, the report says: "The cotton crop may be put down at 10 per cent. over a fair average, and 200 lbs. of lint as the average yield per acre. The cotton crop opened early, and the season has been favorable for picking. Consequently the gathered crop will be over an average. In Cass county, the crop is estimated as about the same as that of the previous year. In Walker county, the low price of the article prevented so much being sown, and consequently there was thought to be a falling off of some 10 per cent. In Jackson county, Alabama, there is believed to have been no great variatian from the crop of the preceding year. The report from Barbour county, in Alabama, states that the crop is not a full one, having been injured by the boll worm and rust."

"The early season was favorable up to the 5th of July. The weed grew up rapidly, and the bottom crop was a full one; the middle and top were seriously injured by the above named disasters. But there will be more cotton made in the county this year than in 1847. In relation to the crop of this State, the accounts are very conflicting, and as yet no satisfactory results can be obtained." Our correspondent adds: "In my opinion, I do not think that the whole crop of the cotton growing States will turn out more in quantity than in 1847, for they complained of no disasters the last year, while in the present, we have observed in the papers, from all quarters, complaints of the boll worm and rust. In 1847, south Alabama was more troubled with disasters than anywhere else, while in Texas, Louisiana, Georgia, and Mississippi, a regular favorable season was experienced throughout, and heavy crops made.

The impression now is that the crop of 1848 will be 2,600,000 bales. But whether it is 2,000,000 or 2,600,000 bales, the prospects are gloomy and disheartening to the cotton planter.

From all sources we learn that prices will range low.

In Texas there has been a considerable increase in the cotton crop over that of the year 1847, owing to more having been planted. Indeed in some counties it is estimated as high as one-third or one-half, while in others some 300 or more bales are mentioned as the first crop raised for exportation. The yield varies from 800 to 2,000 pounds per acre.

The report from Missouri is an average crop, though injury by the boll worm is complained of.

A writer in the Alabama Planter, under date of October 30, speaking of the whole cotton crop of the United States, observes: "Judging from the crop in this region, I doubt not but the entire crop of the United States will not fall far short of 2,350,000 bales, and but for the ravages of the probe worm and rust it would not have fallen far short of 2,700,000. But, during the months of July and August, the rust, accompanied with the worm, were more destructive than the latter was in 1846; but fortunately, and yet unfortunately for the planter, the fall has been very favorable for the top crop, which is now making very rapidly and promises an average crop."

In a letter received from M. W. Phillips, of Mississippi, he says, under date of November 6, respecting this crop: "Last year I placed the crop at 2,200,000 bales, and that of New Orleans at 1,150,000 bales. The extraordinary fine weather, and a late killing frost, 20th November, made the crop to exceed my expectations, but it only reached say 2,300,000 in all, and about 1,220,000 in New Orleans. My impression was that Mississippi would make one-half of what was sent to New Orleans, but I did not think the New Orleans crop would go so high. Mississippi is the largest cotton growing State, but she will fall short of the last crop; and I place my figures now, for the United States at 2,300,000 bales, and that of Mississippi at 525,000 bales. In 1848, the census of Mississippi gave 213,000 slaves; of these 40,000 were under 5 years of age, being 173,730 over 5 years. Deduct from these 53,730, as too young and too old to work, as house servants, &c., and add only 10,000 whites who labor at cotton, it will give 130,000 employed in cotton planting, at an average of 4 bales, and we shall have 520,000 bales." Further: "I think the crop of Mississippi may have exceeded this last year, but the unfavorable seasons for cotton, though very fine for gathering, with an early killing frost, November 2, must reduce the crop; and I should not be surprised if the receipts at New Orleans fall under that of last year by 100,000 bales; the effect on the low grounds has yet to be seen before we can form a fair opinion."

From the price current, it would appear that the receipts at the various ports up to the 30th of December, since the 1st of September last, have exceeded those of the former year by over 372,000 bales, and this notwithstanding the extraordinary low price of this product. So that, if this is to be regarded at all as an indication of the amount of the crop, and it is generally thought to be an important element for the estimate, the cotton crop of 1848 must be fixed considerably higher than that of the previous year.

Some varieties of cotton are mentioned by M. W. Phillips, Esq., in his letter to the office, who says that they have been on trial from two to four years, and so far they prove all the introducers promised. These are the "sugar loaf," "Vicks 100 seed," and "Hogan seed." He says: "The first is the earliest maturing, and easier to pick of any I have tried, yielding as well per cwt. of

lint (better from the field) as the first Petit Gulph; the bolls are rounder and of thinner hull than of any other variety; the bolls growing on the sides of the stalks, limbs in clusters of two, three, or more. Vicks 100-seed is the result of the most patient, persevering, and scientific selections from the field, and a judicious selection in the house as to staple. It is Mexican or Petit Gulph highest improved. The production is better than Mexican, giving a fair yield of lint, and better in maturing and picking qualities. The Hogan exceeds all in productiveness and yield of lint. I have not planted it, but visited the largest patches of it grown a few miles from me for two years, and it holds its own. I may be deceived, but I am willing to risk a trial. There is no deception in yield or quantity of lint thus far, but it may fail as others have done.

He likewise mentions the Banana cotton as being much recommended by some persons, but says that the price of the seed, $1 00 per bushel, precludes all further trials at present till this fall. He thinks the product as good as Hogan's. Of the Brown seed, he remarks: I planted a few seed to test it with the sugar loaf, but prefer the sugar loaf. Another of the same family, *Tarror* seed, from Alabama, was also planted with Brown and sugar loaf, but neither of them yielded equal to the sugar loaf. Pitt's prolific is likewise alluded to, and Mr. Phillips says, though he has never seen it, he has heard from others that it is the best yet known.

He thinks it not improbable that when the prices fall to $1 00 there will be found to be only two varieties of the six, and the names are the result of competition.

Some cotton seed from Mississippi is embraced in this year's distribution, and one or two of the varieties just mentioned form part of the same. We have also distributed a small amount of cotton seed from Syria, brought out by Lieut. Lynch, and though it is hardly probable it can be equal to the best varieties of our country, it may be worth trying how far it would succeed here.

There is reason to believe that the increase of the cotton crop of Texas will be much larger hereafter.

We observe that the receipt at New Orleans of the year 1848, up to a given time, compared with that of the same period in 1847, from Texas, was 747 bales against 32. At present, however, the quantity is so small in the aggregate that it can make no great difference in the general result.

Rice.—As nearly all the rice raised is in the single State of South Carolina, it is comparatively easy to ascertain respecting the appearance of this crop.

We rely as usual on our valued correspondent, R. F. W. Alston, of Georgetown, South Carolina, corresponding secretary of the Winyaw and All Saints Agricultural Society.

He says: "Our rice crop is large, owing much to the previous dry winter, which enabled planters to put their lands in fine tilth. This depends very much on *draining* and embanking. In these respects we can furnish some models for the inspection of the agricultural surveyor.

The season for planting was propitious, with genial showers and a good river, which continued through cultivation.

The season for harvest was very wet and warm, one of the most trying I have known in 20 years; in consequence of this, the quality of the crop, generally, has not been prime, though there are many exceptions. He estimates the increase on the past year at about 8 per cent. The average product is about 40 bushels to the acre, though Mr. Allston says his own crop will average 55 per acre for 700 acres. The amount of seeding he gives at 100 lbs., or $2\frac{1}{2}$ bushels.

We perceive by occasional notices that the attention is turning somewhat more to experiments in this crop in Florida, Alabama, Louisiana, and Texas, and very probably more may be done in this respect hereafter.

Allusion has been made in some of the former reports to the wild rice which is found growing in the lakes and streams in the northwestern section of our country.

Some of the seed of this indigenous plant will be distributed this season. It has been furnished by Professor Randall, of Cincinnati, who has lately come from the Minesota Territory.

It is considered by him superior in taste, and far more nutritious than the southern rice; it grows abundantly as an indigenous production, and can be cultivated to almost any extent in the rivers and lakes that abound in that territory. After the rice is ready for gathering, the tops are tied up in small sheafs as it stands growing in the water, and then the Indian in his canoe passes through it and beats off the seed into his canoe, by bending over the canoe the tops so that the seed may fall aright. An Indian squaw will gather from five to ten bushels per day. It will grow in water, we are informed, from six inches to five feet deep, when it finds a muddy soil. Its stalk, and the branches or ears that have the seed, are described as resembling oats, both in appearance and manner of growing, the stalks being full of joints and rising from one-half to four feet above the water.

Professor Randall, it is stated in a western paper, is inclined to think, that there is as much rice *land* water in Minesota as in the same area of the States of South Carolina and Georgia, and that the Minesota rice ground produces as much to the acre, and will at no distant period compete with the southern production. We have tried it boiled as usual, and have found it very palatable.

The specimen, however, in appearance is not inviting, as the outer skin of the hulled rice is dark colored, though the inside is white as the southern kind. This may be owing to some difficulty in preserving it, and probably if more completely hulled the objection would disappear.

The seed distributed is from four different places, but probably does not differ as to its nature and quality, as it appears in a great measure similar in all.

Sugar.—Provision having been made for an extended report on the cultivation and manufacture of the sugar crop, and some remarks on this subject also being comprised in the communication

of J. D. B. Debow, esq., which will be found in the appendix, it seems hardly necessary to dwell on the appearance and progress of the sugar crop. It is universally agreed that the crop for 1847 could not have fallen short of 240,000 hogsheads of 1,000 pounds each.

It is believed, also, that the product of the year 1848 will somewhat fall short that of the previous year.

The season generally appears to have been favorable, and though we meet with exceptions which speak of the cane being small and dry, yet it is reported, also, to be very ripe and juicy. The amount raised in Texas has probably more than doubled. A crop of 5,000 hogsheads is mentioned as anticipated in the Galveston Journal.

Attempts have been successfully made likewise in portions of Alabama and in Florida to raise the cane, and it may be that there will be more attention hereafter paid to this crop in those States. It is, however, principally in Texas that we are to look for any considerable addition in the course of a few years to the quantity raised in Louisiana. The facts contained in Mr. Fleischman's able report will no doubt evince that a still larger increase may be anticipated. The improvements of machinery, the clearing and adapting new tracts of land, will have this tendency. Complaint, however, is made that the frost affected the cane, and in some cases, it was believed that not more than one-third of a crop would be secured. In the absence of very definite information we have ventured to estimate as we have done.

Mr. Fleischman's report, which will be found in appendix No. 2, will be one of great interest to those who are now engaged in this business, or who may be turning their attention towards it. He has visited many plantations, and observed and gathered much valuable information; and, although it is but a partial report, in consequence of his commission not having been undertaken soon enough in the year, yet it will present the details of cultivation and manufacture to a degree which could not have been anticipated. What adds much, also, to its value, is the drawings of the appearance of the cane, and especially a microscopic examination of the same by the distinguished Corda, whom Mr. Fleischman was so fortunate as to meet, and receive from him his aid in New Orleans, while engaged in fulfilling the commission of the office. Corda had letters from the celebrated Humboldt, commending him to this country as a man of true science; and it is a matter of much gratification that the Patent Office report of this year can be thus enriched by his labors. Other drawings, too, of inventions for mills, &c., and extracts of specifications, add to the interest of Mr. Fleischman's able report.

Large quantities of maple sugar continue to be made, nor have the experiments respecting sugar from the corn-stalk, or obtaining at least molasses in this way, wholly ceased. Yet we have seen no recent results. One person at the west, in one of the agricultural papers, expressed his determination to enter upon it seriously and on a large scale; but we suppose it will not be before another year that the success of the trial or otherwise will be ascertained.

The improvements in the manufacture of maple sugar are now carried to such a height of perfection that, as stated in the communication of B. P. Johnston, esq., secretary of the New York State agricultural Society, premiums were given at the late fair of that society, adjudged by merchants of Buffalo, for sugar from the maple, considered fully equal to the best refined sugars by Stuart or Woolsey of New York. Other samples also were equal to the best sugars of other descriptions from the West Indies. Though the amount in many cases is small, yet, no doubt, many millions of pounds of maple sugar are consumed in families where it is made, in the place of West India sugar. It would seem, from accounts from the West Indies, that the sugar crop of the islands is shorter than usual; so that the Louisiana crop of sugar will, no doubt, find a ready sale. We have only entered the Louisiana crop in the table this year, leaving till the census to take up maple sugar anew.

The extreme difficulty of gaining anything like correct estimates of the amount of *silk* in cocoons, or manufactured into raw silk, has induced us to drop this article from the table this year. The census will, no doubt, give an approximation on this subject. It is, however, believed, from the best information that can be had, that the quantity has rather fallen off than otherwise. Not so much attention has of late been directed to it. And yet, we doubt not, the time will come when it may occupy a large place among our products. Individual experiments have proved eminently successful. The recollection, however, of the multicaulis losses has had its effect, and it can hardly be expected that any who have sunk capital in those experiments will be otherwise than slow again to engage in them.

Other products.—From the answers to the circular of the office, as well as various other information, it is evident that a large variety and amount of other crops are raised in the country, which do not enter into the usual estimates made of our agricultural resources. The root, the pod, and the cabbage fruits, as well as the products of the orchard and woods, add very considerably to the means at the command of our farmers and planters. Still the knowledge we have been able to obtain has no basis on which to found any approximating estimates on which we can feel prepared to place much reliance. We find, on turning to the State census of New York, in 1845, that the number of acres of turnips reported, is given as 15,322$\frac{9}{23}$, and the quantity raised, 1,350,332 bushels. Of peas, not less than 117,379 acres, and 1,761,503$\frac{1}{10}$ bushels. Of beans, 16,231$\frac{15}{19}$, and 162,187$\frac{2}{3}$ bushels. This example is sufficient to show that the entire aggregate, could it be calculated, would be much larger than many would be disposed to admit. Beets and turnips, and other similar vegetables, enter into the statistics of France and other European countries.

The effect of these various plants on the feeding of stock is very important. In some instances we have reports of 1,200 bushels of turnips, and 800 or 1,000 of carrots to an acre, and although these are not common crops, and very far above the average, still, the quantity of food thus supplied in the aggregate must be large. It

is not deemed necessary to enter with any minuteness of detail into these crops. The letters of our correspondents, in the appendix, may supply some hints on the subject, and it is to be hoped that the next census will be so arranged as to include these important products in the returns.

In the Ockonomische Neugkeiten and Verhandlungen No. 19, for 1848, we find some remarks respecting the culture of carrots, which, as coming from such high authority we think may be usefully quoted. Dr. Hlubeck, the author, says: "The culture of the carrot as an interval crop, among rape, winter and summer barley, &c., in consequence of the failure of the potato, has been extensively adopted in Steiermark, Carinthia Alsace, and indeed this culture cannot be enough recommended, as they yield, besides the main crop, an attendant crop of 100 to 200 weight per yoke in roots, which not merely afford an admirable vegetable, but also an excellent food for cows and swine.

The seed is sown in the spring over the main crop; the stubble at harvest is left somewhat higher, in order that the leaves of the carrots may not be injured, then drawn out, ploughed up, the soil loosened and the crop of carrots gathered at the end of October or beginning of November.

The English agricultural journals are filled with articles relating to the culture and management of the turnip, as this product is of such vast importance to that country. At present, however, it occupies but a comparatively slight space with us. And, therefore, it is not deemed advisable to make any additions on this subject, to those in the report of the former year.

In some of the former reports, the article of *artichokes* has been alluded to, and information given respecting its productiveness. We have subjoined in an appendix a translation of a report on this subject by two French professors of agriculture, taken from the Cultivateur, a French agricultural periodical of merit.

The statements given may no doubt be relied upon, and it would seem that the culture of this vegetable is deserving of more attention. It has not been attempted in any systematic form to any considerable extent in this country. The great advantage stated of its being adapted to such varieties of soil, and also so easily kept through the winter, renders it valuable for many parts of our country; the main objection seems to be as to introducing it into any rotation on account of the extreme difficulty of eradicating it when it has once obtained a hold in the soil. It is hardly to be expected that so long as good hay is largely raised with grain and Indian corn, for the food of stock, that our farmers will be disposed to make the trial of the stalks of the artichokes, notwithstanding the strong testimony in favor of their value as dry fodder, especially for milch cows and sheep.

In one of the numbers of the London Gardener's Chronicle, (October 7, 1848,) *vegetable marrow* is highly recommended as a plant which, sown among potatoes, would prove very favorable for the food of swine. These plants are said to contain a rich, sugary, and farinaceous matter, and to be an excellent dish for the table. The writer says: "The seeds may be sown among early potatoes

about the 1st of May, and in the open ground in any warm corner. When transplanting time comes, the potato will not be near ripe, but proceed thus: lift a root of potatoes every five or six feet apart in the row, leaving six or eight rows of potatoes between the rows of marrows, and so on. I find that with moderately rich land I can grow twenty tons to the acre easily. When ripe they can be stored away anywhere, and may be boiled along with other food for pigs, for all pigs' food ought to be boiled. The cottager may grow marrows where other things will not grow, as on walls, trellises, poles, &c. There is no mistake about ripe marrow being first rate food for pigs."

The plant here mentioned belongs to the cucurbita kind, and is cultivated like the common pumpkin and squash. Its fruit is described as being of a pale yellow color, of an elliptical oblong shape—the surface having irregular longitudinal ribs, uniting in a projecting apex. When full grown, it is about nine inches in length and four in diameter, and is by far the best adapted, it is said, for culinary purposes, of any of the gourd tribe. It was brought from Levant, and has been but recently introduced into Europe. The flesh is said to be of a peculiar tenderness and softness, and from this circumstance it has received its name, it much resembling the buttery quality of the *beurré* pear. As a vegetable, it is pronounced to be most decidedly superior to all others of its family.

Bryant, in his "What I saw in California," speaks of a root which he met with on the great prairie, and which he calls by the name of the prairie potato, which he considers, in many respects, superior to the common potato, and which it might be useful to introduce into cultivation.

In some of the reports *mustard* was favorably mentioned, and the case of Mr. Parmalee, of Ohio, was alluded to. By a letter from Samuel A. Barker, esq. of McConnelsville, Ohio, we learn that the success of Mr. Parmalee was confined to but a single year. At Mr. Barker's request, we have given his letter a place in justice to Mr. Parmalee, who was thought to have conflicted with some others in the former report. Mr. Barker says as follows:

In your report for 1845 there are very favorable notices of the mustard crops, given in this and the adjoining county of Muskingum, by Mr. R. Prouty, I. Geely and J. H. Parmalee. Mr. Parmalee took the lead in this business, and having a season, in every particular, suitable for the growth and harvesting of his crop, cleared a few hundred dollars on a crop of 27 acres. This was in 1844. In 1845 many others embarked in the business, but few, however, succeeded. On the same land, with a few additional acres, Mr. P.'s crop was less than in 1844. In 1846, all who had tried a mustard crop appeared to be discouraged, except Mr. Parmalee, and the field was again left clear for him. He rented 30 acres of land near his residence, and close by the German laborers whom he had previously employed, employed them again, planted, tended and harvested his *thirty acres*, as he had done before, and cleaned up *seven bushels* of seed. His loss on this third crop was

nearly twice as much as he had made on the two preceding ones. He assigned all his property to his creditors, and was left penniless by his experiments in raising mustard seed.

I have never known any other person attempt to raise a second crop."

The last report contained an essay on the cultivation of *madder* by M. B. Bateham, editor of the Ohio Cultivator. We have this year subjoined in the appendix No. 7 a translation of a valuable treatise on the culture of this plant in France, by the most distinguished agriculturist and author, Count Gasparin, and which has been extracted from one of the first agricultural journals of France, edited by the gentleman whom we believe was named the minister of agriculture and commerce under the new government of the French republic, Bixio. This treatise enters very fully into the history of the cultivation of this valuable dye plant, and minutely describes the best methods of raising and gathering, and as it never has been before translated, will probably prove an interesting document to our farmers, and hereafter, when the attention is more directed to experiments relating to this crop, be still more prized as a guide in respect to this subject.

Another dye plant which might engage the attention of some farmers in our country, is *saffron*. In the London Gardener's Chronicle for October 7, 1848, we find quoted from the Pharmaceutical Journal, the following interesting account respecting the culture, &c., of this plant.

"Saffron was not cultivated in France before the crusades; the bulbs (*cormi*) from Avignon were introduced towards the latter end of the fourteenth century, by a gentleman of the family of Porchaires, who first planted them on his estate at Boyner. The botanical characters of the *crocus sativus autumnalis*, are well known. The same bulb or cormus flowers once only; and as soon as the flower is withered a bud (*caien*) appears, which, after having produced several flowers in the autumn of the second year, also dies. After the third year the bulbs should be transplanted. A dark, somewhat loose, sandy soil, in a sunny situation, suits it best. Heavy, wet, clayey, and freshly manured soils are unfavorable for its cultivation. The usual manure is the marc of the grape.

The bulbs are planted at the beginning of July, about twelve to a square foot. A temperature of 14° Fahrenheit is very injurious to them, in case the snow does not lie very high. In the Gatinois the saffron herb dries up in May, but it is collected for cows. When the flowers are gathered, the stigmata (*la jaune*) are plucked off, dried, and preserved in dry wooden boxes, for when protected from dampness, the saffron keeps for years. Saffron is adulterated by mixing it with safflower, marigolds reddened by salt, and shreds of beef (*la rouelle de bœuf*). Saffron is employed in dyeing, in cooking, in pharmacy, and in medicine. In France and Spain a balsam or saffron ointment is prepared from it under the name of crocomagna, or crocinium. It is also used as a prophylactic against sea sickness.

The saffron of Lower Austria is the best and most costly in Europe, but the produce is scarcely sufficient for home consumption, and therefore saffron is imported. It is chiefly produced at Ravelsbach, Meissen, Eggendorf, Kirchbeg, and Wagram. Most of the saffron gardens have a substratum of loam, covered about a foot high with mould. Wheat fields are best adapted for the cultivation of saffron, the produce being threefold that of wheat. The garden should be placed dry, exposed to the sun, and towards the south, and protected against northerly winds. They should not be shaded by forest trees, nor be too much elevated and exposed to the wind; Districts favorable for the cultivation of the vine suit best.

The flowering season begins during the last week of September, and ends in the first week of October; but it sometimes lasts till the beginning of November. The soil is prepared after three methods; the first is similar to that of preparing garden beds. By the second method the field is ploughed in autumn after the harvest, the same as for wheat, only somewhat deeper and narrower. According to the third method, the field is ploughed immediately after the harvest, (whether of wheat, rye, or oats,) and then rolled and harrowed. Three days before planting, the field is trimmed. The manure is only added during the planting, but so it is well covered with earth, and does not come in contact with the bulbs.

This method requires the best soil and the smallest and best manure, as sheep manure. The saffron bulb is called in Austria *kiel*. It is of the size of a walnut, surrounded by ten or twelve bass-like membranes, of a cinnamon brown color, which terminate at the top around the gem, in capillary threads called *bollen*, but in such a manner that only about three of them reach the top, the others being shorter and finer. The multiplication of the saffron proceed from these bulbs; (*kiele*,) no case is known of a flower producing seed. Each bulb produces within half a year, namely, between autumn and the end of spring, from one or two, or from three to four new young bulbs; but the parent bulb perishes in the meanwhile every year, and nothing remains of it but some coarse, blackish brown membranes called *bollen*, and a dried hardness (the plattel,) on which the young bulbs are seated. Before the bulbs are planted they must be cleared of all membranes remaining of the parent bulb of the plättel, &c., and all damaged or diseased bulbs rejected. They are stowed away from three to four inches high, in a dry, airy place. The sowing is performed by two men, one making with a hoe furrows of eight inches depth, the other placing the bulbs three inches apart and pressing in the ground so that they are half covered. The saffron flowers appear before the leaves and can easily be removed without disturbing the bulb; the best time for gathering them is early in the morning while they are closed. When gathered they are spread in a cool room, on cloth or straw mats until fit for picking. The picking (called *saffron-losen*,) consists in separating the trifid stigma from the style and removing it from the flower. This is done the day after the gathering, and must be performed without separating the parts of the trifid stigma (called the *zunglein* or little tongue) from one

another. These should remain adherent, or, as it is said, "the bock should be entire." Little or nothing of the style should be left attached to the stigma. In this way the saffron has a better appearance, and fetches a higher price. On the following day it is dried on a hair sieve over a charcoal fire, and placed in boxes without compression. After a few hours it becomes oily and flexible, and can then be pressed into well closed boxes. Most of the Austrian saffron is sold at Krems on the 28th of October. Its price is from 30 to 32 fl. [=36—38 fl., 24 Rr. Rhenish,] per lb. After the crop of the first year the green leaves are left growing till the spring of the next year, and in June when they begin to wither and become yellow at the top, they are removed as food for cattle. The little bulb (*knöllchen*,) which in the first year had formed itself on the parent bulb, and from which a little tube, or without a flower had already grown in the autumn of the second year, goes on swelling till the spring. About Whitsuntide the new bulb (*kiel*) called *kindel* is perfect. If everything goes on well, the saffron garden in the autumn of the second year contains two or three times the quantity of bulbs (each bearing two or three flowers,) originally planted. If the bulbs are left for the third crop nothing else is to be done but what was required after the first; namely, mowing the grass and carefully removing the weeds in July. It is, however, remarkable that neither bulbs nor flowers multiply in the third year. The bulbs having now yielded saffron for two, three, or four years, are removed about Whitsuntide, when the new bulb (*kiel*) is perfect, the saffron grass gathered, and the bulb has quite disappeared. By means of a coarse sieve they are cleared of the adhering mould and stored up in an airy barn or loft."

Appendix No. 12 contains, among other particulars, some estimates respecting the *proportion of cornstalk and straw fodder*, with their value. Although the replies are limited to a few States, still enough can be ascertained by it to show that these are important articles to the farmers in some portions of our country.

Amid the rich profusion of the west, comparatively little may be thought of these means of feeding stock; but in the eastern and middle Atlantic States, we find that the value put upon them renders them equal in many cases to two-thirds or one-half of the hay crop by the acre. Indeed, in some cases, our correspondents appear to regard them, when cured in the best manner, equal for the acre to the hay crop. Many persons are not aware, till they make such an examination as we are compelled to make, how vast is the quantity consumed thus in some of the States. Farmers, in not a few cases, rely much on these articles as subsidiaries to the other means of fodder at their command. They are so fed out likewise that what is not eaten is turned to good account by being thrown forth for the production of manure; and in this have a greater value than they would if left wholly upon the field.

The subject of *fruit* is attracting increased attention in our country. During the past year an important step has been taken in the Pomological convention, held at Buffalo, at which were assembled large numbers of intelligent fruit growers and connois-

seurs of fruit, who engaged in discussion respecting a great number of varieties of apples, pears, peaches, cherries, &c., and adopted certain rules which might hereafter aid in giving uniformity to the naming of the varieties existing in the different parts of the country, and render the kinds cultivated more choice and profitable. A vast amount of information was thus elicited by the free interchange of sentiment, and a regular society was formed and rules adopted which, together with the accounts of the proceedings of the convention, will be found in the appendix No. 3, in the communication from B. P. Johnson, esq., secretary of the New York State Agricultural Society.

In the spring of 1848, a circular was addressed to individuals in the principal cities of this country, to obtain, if possible, estimates or records of the quantity of *strawberries* and other small fruits which were brought into market in the season. The difficulty of attempting it, it would appear, seemed so great in most cases, that we have been unable to present any such returns. We hope, however, we may yet succeed in procuring something on these from Cincinnati, as the possibility of acquiring the imformation there seemed to be more likely.

If not in time to occupy a place in the body of the report, it may yet find one in the appendix No. 8. The comparison of the prices reported from the answers to the circular, in the appendix No. 12, will be interesting. In some cases, the high price of these fruits may astonish many who have not turned their attention to the subject. Though holding but a minor place, yet at the prices in different parts of the country, there can be but little doubt, that were the whole aggregate known, it would form a considerable item of receipts by those who carry them to market, while, as a pleasant luxury at home, it forms an agreeable additon to the means at the command of the farmer, who may so independently rely on the products of his own fields and woods for both his necessary food and many of the additional comforts of life.

The peach crop this year has been very large. Immense quantities were brought into the markets of New York, Philadelphia, Baltimore, and further south, and the fruit was also for the most part excellent.

We see that the Delaware crop is estimated by our intelligent correspondent at 500,000 bushels. This is a large amount for so small a State. If there were added those raised in New York, New Jersey, Pennsylvania, Ohio, and other States, the aggregate would be very largely increased, and some calculations might be made on such data, as to the value of this single species of fruit to its producers. The number of persons who supply the great quantities consumed in the markets of the Atlantic cities is comparatively few, but it shows what persevering industry and skilful adaptation will effect, when urged on by energies such as are possessed by the proprietors of these fruit fields and gardens.

The attention of our agriculturists has recently been turned to the Osage orange, as a means of forming hedges, and some of the seed of this plant has been procured, and will be distributed among

others this season. It may be desirable, therefore, to subjoin here some notices respecting it.

We have taken from the Prairie Farmer, the following account of it, with a statement of its advantages, drawn up by Professor J. B. Turner, of Jacksonville, Illinois, who appears to have been unusually successful in its cultivation:

"The Osage orange, the favorite hedge plant of the United States, has already become too well known to need any particular description.

"It grows in the wilds of North America, in regions further north than New York, and further south than the Carolinas. It is usually in this country from 10 to 15 feet in height, though, like the English thorn, it is said sometimes to attain, in its native soil, a height of 50, and even to 60 feet.

"Its utility, as a hedge plant, is no longer an experiment. Hedges of the rarest beauty and excellence have been growing in Boston, Philadelphia, and Cincinnati, in Kentucky, Tennessee, and northern Missouri; and, in short, in all the middle and southern States. Some of these hedges have been standing for 10 or 12 years; they were planted by gentlemen of wealth and taste, around their favorite walks and grounds, at a time when the plants sold at the rate of $5 00 per thousand. Among all who have written on the subject, no unfavorable account has ever come to the knowledge of the writer. Great losses have been incurred with the seed, as might be expected; but the plant and the hedge are universally admired and commended; and it is confidently believed by the best judges, that it will double the real value of any farm it surrounds. But the community must first learn that there is as much difference in the quality and comparative value of hedges and hedge plants, as in houses, or dry goods, or anything else on sale.

"Recent writers thus enumerate its many advantages:

"1st. *Its tenacity of life is scarcely equalled.*—It is a native of the prairies, and will grow on any soil where common prairie grass will grow. Overflowing the land does not harm it; it will live for weeks and months entirely under water. The dead wood is exceedingly hard and durable, and fresh shoots from the stump soon supply the place of all which have been killed by fire or cutting.

"2d. *Its protection is perfect.*—It is armed with a very sharp, stout thorn under each leaf. Its dense iron branches soon become so interlocked that no domestic animal, and not even a common bird, can pass through it; both its thorns and its bitter acrid juice prevent all animals and insects from browsing or feeding on its branches. Its seed is like the orange, and its roots like the hickory; consequently it can never spread into the field either from the seed or from the root, but keeps its own place, growing stronger and thicker year by year. It thus perfectly secures orchards, fruit yards, stables, sheep-folds, and pasture grounds from all thieves, rogues, dogs, wolves, &c.; and one good gate, well locked, makes a whole farm secure from all intruders of whatever description. It may be trained so high as to afford shelter to stock, and break

off the rough prairie winds from all grounds needing such protection. Plants may also be prepared so that it can be set in the open prairie, without fence, with perfect success.

"3d. *Its beauty is unrivalled.*—Its dense mass of dark green leaves, its flowers in spring, and above all, its golden orange fruit throughout the fall months, make this hedge the most beautiful one ever beheld. It is now so cheap as to lie within the reach of every farmer in the country. Select plants have been advertised for sale in some of the eastern cities at $12, and in the west at $25 per thousand.

"The modes of setting and trimming heretofore proposed both in the east and west, necessarily require five years to perfect the hedge. The writer is satisfied, from actual experiment, that his mode of planting and trimming will make a hedge in this country more perfectly secure, especially against swine, in three years time, and at about half the cost and labor."

Professor Turner offers to sell plants ready for setting, so that the hedge ready set will not cost more than $15 for 80 rods.

In a letter from Walhonding, Ohio, the following method of making a hedge of American thorn has been communicated to the office by Mr. Eli Nichols.

He says: I consider the American thorn will never be extensively cultivated and profitably used as a hedge plant, until the plants are set about two feet apart and the space between filled about twenty inches high with stone or brick, flag stones edged being the cheapest, and next a rough wall of that height.

All attempts to make American thorn grow thicker than this will enfeeble the plant and finally ruin the hedge, but stone and thorn will make a cheaper and better fence than either, separate.

Then he gives an account of an experiment with another plant. But the experiment which I value most is a new article, the dogwood (cornus florida) set in a new way. Mr. Nichols mentions his intention to prosecute his experiments further in order to prove the practicability and cheapness, and as he may, perhaps, seek to make it the foundation of an application for a patent, the method cannot now be described. So far as his trials have been made, he appears to be sanguine of complete success.

Hedges are of importance in many parts of our country where timber and stone are scarce for fences; though many writers on agriculture seem to doubt much the utility, on the whole, of partition fences, as they harbor so many insects, in some cases interrupt the more easy ploughing and occupy considerable room.

Mention was made in the last report of the grapes of Texas, and among other varieties, one called the *mustang* was stated to promise to become valuable, and deserve the attention of those who cultivate the grape. We notice that, by a late experiment on this grape vine, it proves to be an excellent one on which to graft other species. The Lavacca Herald speaks of a case of this kind, and mentions that Captain Hutch engrafted a species of the English on a vigorous vine of the mustang, and so great was the life and vigor infused into the young graft by the parent stem, that, in

the course of one season, it entirely covered a large oak tree, around the trunk of which the wild vine had been accustomed to cling for support. The young vine bore the first season, at the lowest calculation, 600 bunches of grapes. Other excellent varieties of the grape may, no doubt, be introduced into the Atlantic and Western States from California, which is said to abound in this fruit. The more the attention of fruit raisers is turned to this subject also, it is probable that the characters of our native grapes in all parts of the country will be developed, and experiments tried to improve them by cultivation. It is believed that many varieties exist in the larger settled States which have not been examined, and which may hereafter become valuable.

The following statement respecting the grape crop of Ohio, is from a communication of N. Longworth, esq., to the editor of the Cincinnati Gazette. The editor of the Gazette had thus described the prospect: "The vintage on the Ohio has commenced, which will last for two or three weeks. We are glad to hear that the damage to the grape crop has proved very light to what was feared. Many vine dressers, who, a few weeks since, expected to lose two-thirds of their crop, will not lose one-eighth. There are now several hundred acres in this county alone devoted to the vineyards, and the amount of wine made will be quite large, for which a sure demand exists."

In reply, Mr. Longworth says: "I regret to say that you are under a mistake when you say that 'the grapes in our vicinity have not been seriously injured.' My tenants, about two months since, confidently calculated on making 25,000 galls. of wine; but the rot came, and they have, on an average, lost two-thirds of their crop, and they will not make more than 8,000 or 9,000 gallons. One of the vineyards, adjoining others similarly located, escaped entirely. It is worthy of note that in general, grapes in the bottoms, or near the bottom of the hill, escaped; but our grape culture has increased so much of late years, that I presume the quantity of wine made this year will be greater than in any former year. The fruit ripens from three weeks to a month earlier than in any former year. In some vineyards, the grapes ripen badly. The cause is evident. In Europe, to ripen the grape well, exposure is necessary, (to the sun,) and when about to ripen they cut off the shoots and leaves. In our hot climate some protection from our hot sun is necessary. Our Germans most generally do just as they did in Germany. But from adherence to this rule, good sometimes arises, and there is an instance that may account for the grape rot. I believe the rot rarely occurs in a gravelly soil. On the top of the hill at Tusculum, I have seven vineyards in bearing, and six of them suffered more or less from the rot. Many of them lost more than two-thirds. Those escaped most where the hill was steep, and the water passed off quickly. One of them was in charge of a German uncommonly dull, who dug his ground just as he did it in Germany. He trenched the ground into beds about twelve feet wide, and raising the ground some 18 inches, or two feet, in the centre, and sloping to the sides, where there is a gully

that speedily passed off the water. He has not a rotten grape in his vineyard, which covers nearly seven acres."

The grape culture is carried on to some extent also in Missouri. We find it stated in a public journal, that farms in the neighborhood of Hermann, Missouri, have risen very much of late in consequence of the increased cultivation of the vine. A Mr. Poeschel, who has a vineyard of not quite an acre, which was planted with the Catawba grape, in the spring of 1845, made from it this year 1,000 gallons of wine, and the value of the whole produce was $1,700.

Among the plants which seem to promise to become an object of interest for cultivation in the United States may be mentioned the *tea plant.* By the enterprise of Dr. Junius Smith, the experiment has recently been begun in South Carolina, under circumstances which would indicate that the question of its success may soon be decided. Partial attempts have before been made by planting a few seed. But Dr. Smith has brought out plants of seven years growth, and only a week or two since announced to the New York Farmers' Club that it is in blossom. In his letter respecting this fact, he says: That on the 15th and 16th of December, 1848, he planted out at Greenville, South Carolina, the tea seed which he carried with him, and went to work preparing the ground for the reception of his tea plants, which, he adds, "was no slight labor in this hilly, rocky, stumpy, rooty domain." His packages of plants arrived some time after him, and on opening them, he says several of his plants were in full bloom, with their leaves fresh and green, as if growing in China; others with the blossom bud just showing its ivory breast ready to develope all its beauties.

"You may say, therefore, that the tea plant is in blossom in South Carolina. On Tuesday the 26th of December, he planted out the *first tea shrubs ever cultivated in the United States for agricultural and commercial purposes.* Out of five hundred plants he found but five which he thought of doubtful vitality, and these he transferred to the infirmary, and subjected them to vigilant nursing."

We have deemed this event of sufficient importance to be thus distinctly chronicled in our report, as should the attempt not disappoint the expectations of its enterprising projector, the period of the introduction of the cultivation of the tea plant in this country will be an era deserving remembrance, and the name of the introducer will be associated with those of similar benefactors to their countrymen, who have, by their enterprise and talents, added greatly to our resources and prosperity.

There is a large tract of our country which falls within the latitude in which tea is most successfully raised in China. In Dr. Smith's pamphlet on the subject, he says it grows there most luxuriantly between the parallels of 20° and 45° north latitude. "In the geographical and physiological views of that portion of the United States, presumed to be best adapted to the growth of the tea plant," he says: "We may assume the latitude of 40° as the northern, and the Gulf of Mexico as the southern limits of the tea

growing districts. The extent of country lying south of 40° north latitude embraces Delaware, Maryland, and Virginia, Kentucky, and partially the four States of Ohio, Indiana, Pennsylvania, and Missouri, and all the States south of these. The northern portion of Newcastle county, Delaware, he states, is parallel with Pekin, one of the finest tea growing districts in China. Parts of Maryland are also thought to promise well, being parallel with another tea growing country in China. In the upper country of South Carolina, he states, we are parallel with three of the most abundant tea growing provinces of China. Arkansas, Missouri, Tennessee, and Kentucky, are also mentioned as possessing more or less adaptation to the culture and growth of this exotic. The annual consumption of tea in the United States is about 11,000,000 pounds; and Dr. Smith remarks, that upon the hypothesis that the average product of an acre of land is 547 pounds, it will require the cultivation of 20,109 acres of land only to supply the present consumption of the United States. Allowance of course must, however, be made for the increase of consumption which, for many years, will probably be in advance of the amount that can be furnished at home, so that, should the attempt to introduce the growth of it among us be crowned with success, there will be a wide field opened to supply our own wants, to say nothing of the foreign market that may open to us.

In this view of the subject, the enterprise is one which must warmly enlist the best wishes for its success of our fellow countrymen; and the day may not be far distant when they may have the pleasure of regaling themselves with cups of delicious tea made from the fresh products of their own soil and industry. A writer from China remarks, in reference to fresh tea: "We drank some green tea in less than thirty-six hours from the time the leaves were plucked from the plant. There is hardly any thing so delicious as fresh green tea drank, as the Chinese always drink it, without sugar or milk. You must come to China, if you wish to taste this luxury, for all green tea loses *much* of its flavor by being kept; and the *finest kinds* will not bear to be transported across the ocean."

It is well known that the tea plant has been introduced into Brazil with some success. In Assam, the British government has so far determined the question of practicability that hopes are entertained of ultimately being able to raise enough to supply the English market.

The *dairy* and its products is every year becoming more a subject of interest to the farmers of our country. Great advances have been made within a few years, and new information is continually elicited on these important topics. In many of the agricultural fairs, and the reports of agricultural societies, these articles hold an important place. Observations respecting them will be found in the communications in reply to our circular, placed in the appendix No. 3. We propose, also, to subjoin, also in an appendix No. 9, some of the best drawn up statements as to the manufacture of butter or cheese, and which have appeared since the last report.

A new method of increasing the quantity of cream produced from milk, and preserving milk, has been discovered by Francis Bernard Bekaert, a citizen of Belgium, and we find it thus described in Newton's London Journal for January, 1848, in an account of a patent for the purpose, taken out in England: "The invention consists, firstly, in a method of increasing the quantity of cream produced from milk, by the addition of one table spoonful of the liquid, hereafter described, to every quart of new milk; the milk is then stirred once or twice round, and left in the pan or vessel; and the skimming may take place at the expiration of the usual time, but the patentee prefers to delay it a little. He states that, by the application of the liquid, a much larger quantity is forced to the surface of the milk than can be obtained in the ordinary way. The liquid is prepared by adding to one quart of water, one ounce of the carbonate of soda, one tea spoonful of a solution of turmeric, or curcuma, and three drops of marigold water. When making large quantities of the liquid, it is not requisite to weigh the soda, as the same purpose is answered by putting such a quantity of soda into water as will, when dissolved, on application of a Salometer known in Belgium, by the denomination of a "pêreset," show a density equal to ten degrees. The soda is first mixed with the water, and then the solution of turmeric and the marigold water are added.

"The patentee claims, under this head of his invention, any salt of soda, when mixed as before stated, and applied to milk, for the purpose of causing a larger quantity of cream to rise to the surface the milk than is procured by the ordinary process. The soda and water form the basis of the improvement, the solution of turmeric and marigold water being only used to improve the color and quality of the butter made from the cream, and not being essentially necessary to effect the increase of the cream. Although the patentee finds the use of the soda most convenient, he claims any other alkali when applied in a similar way.

The second part of the invention consists in the following method of preserving milk: One table spoonful of a solution of soda, made by dissolving one ounce of carbonate of soda in a quart of water, is introduced into a quart bottle, nearly filled with new milk, only sufficient space having been left for the spoonful of liquid; after which the bottle is corked, and a piece of string put round the cork to prevent it from flying, and then the bottles are put into a copper or other vessel containing cold water, which is to be gradually brought to the boiling point. When this has been effected, the fire is to be withdrawn from beneath the copper, or the vessel, if moveable, is to be taken off the fire, and the water and the contents of the bottles are allowed to cool; the bottles are then taken out of the water and packed away."

We have seen no account of the testing of this process, and have quoted it as a method which can be easily tried. Possibly there may be something of value in it. The use of alkali in milk for various purposes has been common before; but the precise mode of application may perhaps be new.

It is also mentioned, in some of the foreign journals, that a chemical process has been discovered on the estate of Count Talbot, Toxall, near Stafford, England, which, when used with milk at the milking, will keep it fresh and good for a long time. It is also said to render the conversion of milk into butter and cheese easy, but the particular method is not given; it may possibly be the same, or a similar one, with that we have already quoted.

In Riecke's Wochen Blatt is an article by C. Schintz on the testing of milk, from which we translate the following remarks: "The testing by the police of the milk brought for sale to cities is commonly done by the aræometer; and this instrument, in connection with the judgment afforded by the color and fluidity, is sufficient to prove, superficially, the quality of the milk; but the aræometer may give occasion to error, as the milk is the lighter the more fat it contains. It is, therefore, worth the pains, at least, to possess a method by which, in no long time, and without expense, a positive result may be obtained as to the proportions of the milk. Some investigations and experiments, made for this purpose, have brought me acquainted lately with the method of Dr. Haidlen, in Stuttgart, as a simple and pretty ready one. And as it is a subject of interest to agriculturists to know the quality of milk according to the fodder, the following communication will not here be out of place. It is known that milk has the peculiarity of foaming up very much in boiling, and covering itself with a thick scum; but this so hinders the penetration of the milk with steam, for the purpose of separating the water from the solid elements, that we can in this way reach no accurate results.

This now is simply and conveniently attained, if we put in a little shallow porcelain saucer $\frac{1}{10}$ of an ounce of finely pulverized gypsum, and pour over it one-half ounce of the milk to be examined. As soon as this mixture becomes warm, the milk is quickly decomposed. Butter and cheese attach themselves to the gypsum powder, and we can then let it boil quickly without any danger of losing any portion of the solid substances. We may, therefore, conduct this operation in the most convenient manner by placing the saucer on sheet iron, under which is set a little common spirit lamp. When the contents of the saucer has reached to a doughy consistency, which takes place in a quarter of an hour, then must the heat be diminished in order that the organic elements of the milk may suffer no elementary decomposition. A vapour bath is appropriate for the drying of the paste in the best and simplest manner, and the most compendious arrangement consists in placing beneath the porcelain saucer another similar but somewhat deeper one, made of copper, which is partly filled with water. The gypsum paste becomes gradually changed into a large, grained, dried powder, so that it is easy to perceive when the water has evaporated. We then place the saucer in the scales, note the weight again, return it to the vapor, and after some time weigh it again; as soon as the two weighings successively are equal, we may then take it for granted that all the substance of the water is lost, which it can lose at 100° of centigrade.

If the weight of the empty saucer has been before accurately noted, then from this the proportion of solid elements in the milk can be easily computed.

The gypsum which is employed for this purpose is burned and again dissolved, and then dried in the form of powder at 100° centigrade, and kept in a well closed flask. If also we wish to know how much fat is contained in that portion which contains the solid residuum, it can be readily seen if we extract the powder in it by means of sulphuric ether; the loss of weight thus occasioned then gives the quantity of fat which is contained in the milk.

On an average, milk contains 10 to 12 per cent. of fatty matter; but milk which is designed for market is commonly robbed of its creamy quality, so that it often contains only 6 per cent. of solid parts, and that which is bought at double the price of milk for cream, I have found contained 14 per cent.

The aræometer used for measuring the quality of cream, mentioned by the author above, is thus described: The aræometer or guage is a very deceptive instrument for the purchase of milk brought to market, as by a double adulteration the original weight may be again restored, when, by skimming off the cream, the milk becomes heavier, and by the addition of water is rendered lighter again. Besides, the usual aræometer cannot be used for the purpose, as the range of the different specific weights to be here met with is only from 1 to 1.04, so that for example, in Beck's aræometer, for heavy fluids, only the degree of 1—7 comes into consideration; in such an aræometer therefore to be made useful, it must be read off at least by quarter degrees. But, provided with a scale of this sort, the aræometer can only be profitably used for judging of the quality of milk, when we either know beforehand that the milk has received no addition of water, in which case it allows you to conclude on the greater proportion of cream the lighter it is; or, if skimmed milk is subjected to examination, in which case it may be regarded as of better quality the heavier it is found to be.

Many valuable observations might here be introduced from a volume procured recently from Germany, bearing the title of Die Milchwirthchaft, in Inner grosser Stadte und deren nachster Umgebung, or the Dairy in large cities or their vicinity—a manual for dairymen, by Joseph Ritter von Schrieber. This work is highly commended in the German agricultural journals. It is, as it professes to be, "a guide to the choice of animals, with a constant regard to a near and large place of consumption according to the best observed and latest experiments, with the advantages thereto belonging, and how to feed, take care, withhold and protect from accidents, also to manage the products, and in the most profitable method impart to them a value."

In the prosecution of this design, he discusses with much ability a great variety of topics connected with the general subject. We can but glance at a few of these, but should there be sufficient time to do so, may add something further to the appendix. In his first chapter, he treats of the stalls for cows, and enters with par-

ticularity into the mode of construction and their external situation, dwells on the chief requisites, air, light, space, and points out how the various desirable objects may be secured. He urges strongly that the stalls should be from 10 to 12 feet in height, so as to allow full and free ventilation; that it be maintained, if possible, at an average temperature of about 60° Fahrenheit, as the degree proved by experiment to be the best. He considers light also to be very necessary, and a space for each head of 7 to 8 feet long by 3½ to 4 feet in breadth should be allowed. He likewise gives particular instructions respecting the rack or manger, accompanied with many sensible suggestions.

The next principal topic which engages his attention is that of the choice of a cow destined for milk. Here he examines into the different races, and notes the methods on which some degree of reliance may be placed, and after speaking of Guenon's method, admits it to be ingenious, but deems it for the most part impracticable, or so complicated in its details as to be of little use.

The peculiarities of the various races are distinguished as to hair, color, bodily form, &c. He mentions here the Mürzthal cow, which, it may be recollected, was recommended by Mr. Fleischmann in the last report, and the notice of which, at that time, appears to have excited a wish in several of our stock breeders to import it to this country, an object, which it is hoped, may be effected. As this part of our author's remarks may be interesting to our countrymen, we will quote it:

"It is raised in the charming border territory of Upper Steiermark, which reaches from Lower Austria, beyond Sommering, along the course of the little rivers Mürz, opposite the bridge which crosses at Mur. This beautiful breed, like the lovely country itself, appears to have been produced, as already mentioned, as one from the first stock or race. The whitish, grey cow of southeastern Europe, by the influence of cultivation, but especially by the enjoyment of aromatic pastures on the mountains, sometimes their resort, have become very greatly improved, and established a middle race. Their original peculiarities of bodily form have, under the advantageous circumstances of centuries, raised them up to the noblest representatives of the first stock breed. In bodily structure, the Mürzthal breed have assumed an entirely different, rounded, and agreeable form; their skin and hair have become more elastic, finer, softer; the color itself has changed from smutty white into slatish grey, and often in the case of bulls, the cattle are wholly dark.

"The peculiarities too, which, in the orignal stock were defective, have also undergone a change, but those remain which were valuable in the former; the capacity for milk is maintained, while on the other hand the capacity for fattening is not lost.

"From Mürzthal, this breed of cows have spread into the neighboring country of Lower Austria, especially in the two forest regions, where the cultivation of fodder, and particularly of clover is carried to a large extent, and where in the vicinity of the resident population of nearly a half a million, the new milk business must

be c nducted with energy. By crossing also the same with the native cows, a generally lighter colored breed passing into a slate grey is formed, which with good feeding, is rich in milk, large and stout for draft, and easily to be fattened. We may call them in general, *Austrian native breed.* Since the existence of the exhibitions of horned cattle of the Imperial Agricultural Society at Vienna, and distribution of prizes to the country, these cows have improved in a very satisfactory manner. The efforts of the villagers to procure good bulls, partly from Mürzthal itself, and partly by inbreeding, has been followed by the most profitable results; we already see with pleasure whole herds of beautiful approved cows on the pastures, and only here and there is there an individual which, on account of the poverty of its owner, is deficient in food. The not unfounded preference for a *light color,* causes the farmer to choose in the raising of calves those of this kind, and we find by far the greatest numbers of the whole, white, passing into pale yellow, light brown, or slate grey; the latter color, for the most part, predominates among the bullocks. This breed often endures admirably the rough and rapidly changing climate of Austria, succeeds with suitable care, and in the course of years standing in the dark stalls of the city, not a little of its usefulness.

"The Murzthal breed has spread out of Austria into many parts of Germany. I have met with some pure herds in Bavaria, Wurtemburg, Silesia, &c. In such cases they have not fulfilled the high expectations which was formed of their milk product, because the altered mode of treatment and fodder did not agree with the animals that were accustomed to their so richly aromatic mountain pastures.

"*The Murzthal cow is then peculiarly the invaluable source from which the cow breeders of the provinces, and contiguous countries, derive fresh blood for their native breeds; it is the valuable race which serves for a constant demand of the lowlands lying in the vicinity, more for the object of recruiting their stock than for pure breeding.*"

Mr. Von Schreiber next lays down his rules for the selection of single animals, alluding to the bodily form under the the particulars of bony system, horns, hide, hair, and size of the body. Every part of the animal is considered and portrayed, then those indications which are useful for judging as to the capacity for milk. He gives the method for raising the calf and also of foddering and taking care of the milch cow, and under this head offers many valuable suggestions, the result of long experience. The following are his signs of a good cow:

Signs of a good cow.—Bodily form desirable. This is expressed first, by the *bony structure*, by the *condition*, *form*, and position of the *loins*, by the state of the *hide and hair*, and by the *size of the body*.

The *bony structure* should be firm and compact. Great thick bones are mostly of a spongy kind, and betray a similar peculiarity of all other parts of the body; especially must the head be light

and fine. The judgment of the head in cattle is of the greatest importance; a practised cattle breeder will be in a situation to form a pretty correct judgment of the worth of the animal by the mere sight of the head. With cows, as with bulls, a fine and little head, and also clear large eyes, and widely opened nostrils are desirable.

Next in importance is the build of the *chest and of the breast*. On the customary space in the hollow of the breast depends the normal functions of the lungs and heart. This should, therefore, be sufficiently wide and deep, as a continual contraction disturbs, to disadvantage, all the other functions of the animal organization, and, at the same time, the assimilation of fodder, and hence, for milk.

In calves, tenderness and whiteness of flesh may be distinguished by the light color of the hair, and, therefore, white calves are preferred before dark colored ones; but white calves are only to be expected from light colored cows.

The value of a cow for milk depends essentially on her age. The highest degree of capacity for milk, normally, is with the *third* calf, (in general in the fifth year of her life.)

Schreiber's marks to choose a good milch cow are the following:

1. *The udder.* By feeling, ascertain whether the size is owing to superfluous flesh or not. It should be examined both *before* and *after* milking. Before milking, especially in the morning, because then the most milk is collected, it should be full; not hanging down between the feet, but wide and broad, extending on the belly, and hard and almost shining. After a clean milking out, it should be soft and appear like a large empty bag. Flesh udders may be known by the want of this criterion.

As for the *teats*, all four, the usual number, should be milky, so as to be able to change the two and two in milking; if one of them withholds milk, the udder is defective.

There are udders which have two little teats, and so in all six teats; but these two small ones are not capable of being milked; besides I have only met with this appearance in good milch cows. It is desirable that all four of the teats together should form a square and be of equal size. They should not be too broad and thick, but long and thin. Every excrescence on the teat, whether a wart or other prominence, or a crack, is a defect, which impairs the milking while it occasions pain to the animal. It is also a good sign when the udder is almost wholly without hair, or covered only with a few short, fine, shiny hairs.

2. The *milk veins*—that is, those organs which form the blood channels, and run along on both sides of the belly in two main branches, are not less decisive proofs of the value or little worth of a milch cow. If they run on clear, full within and strong, or are they crooked, serpentine, knotty and confused; if, further, there are openings, gaps, at which the milk veins on the belly end, (little milk pits)—especially those on the left sides, and they are large and distinct—these are marks of a strongly developed milk system which is favorable for the secretion of milk; and, besides

indicate that the cow may, by good food, afford a milk product in large quantity.

Here is the place to oppose a delusion which I have often met among cow breeders: they give great value to compactly expressed milk veins, as they believe that these milk veins conduct the milk to the udder, and accordingly maintain the fluid running in the milk veins (the blood) to be milk.

But they should know that these so-called milk veins have scarcely any direct relation with the milk and the udder; but they are the canals which conduct the blood from the breast to the veins of the groins. Besides, the two milk veins are not equally strong; usually the left one is the stronger, which is therefore called the main milk vein. If these two great milk veins are branched into smaller milk veins, with little separate pits, before they end on the belly, this is regarded as an admirable sign of capacity for milk.

3. The *state of the outer cover*, i. e. the *hide and hair*, presents also a mark by which to ascertain the capacity. The hide should be thin, light, supple and greasy—the hair short and fine. A thick, stiff and coarse hide, and bristly hair, are poor signs for the milk capacity of a cow, as well as in general to be but little commended.

4. *The bony and bodily structure*, finally, must not be too strong, the bones not too thick; on the other hand, the neck and snout long, the rump broad, the forepart lighter, the tail long and thin. Fine and shining horns many persons also consider a property of good milch cows.

The first and main impression which an animal rich in milk makes on the beholder must be a certain *feminine* type—a female, I might say, *softer* form of body—which expresses itself in all parts of the animal structure of the members. A longer practice of the eye places us in a situation to form this impression *at once;* and this it is which will not deceive us, except in a very few cases, and the less when also the signs heretofore mentioned give a favorable indication.

On the subject of feeding, the author lays down some rules; and, although this might be introduced in another part of the report, yet it may not be inappropriate here.

They are of a general character, and apply to cattle as well as to milch cows.

1. The animal needs for its sole support of life for every 100 pounds of bodily weight (live weight) 1½ pounds of hay or fodder, which is reduced to hay value. All above this may be termed *production* fodder.

2. We should feed cattle to their full satisfaction. The proof of this in good health is that they will eat no more, lie down and begin to ruminate.

3. In adapting any quantity computed as fully satifactory, regard should be had to the bodily appearance of the animal; if we perceive that it is comfortable and thrives, together with a perfect fulfilment of the object of its keeping, then we should continue this method of feeding, unless there be others of still greater profit in view.

4. The quantity of fodder must be taken in the mass according to our purpose, together with the greatest possible profit from milk, also to obtain a value in flesh.

5. In an often unavoidable change of feed, we should ascertain accurately the proportion of the value of the substituted fodder to the former one, in order that the same quantity of nutritious matter may be appropriated to the improvement of the animal.

Together with the above we find some maxims also laid down for the better carrying out of these rules. But to dwell on these particulars would occupy too large a space.

As to the method of feeding, he presents three points as assential to be kept in view—the *proper time;* the *preparation* corresponding to the object and the *quantity* of the various portions of the fodder. In winter, he recommends the first meal to be given at 5 o'clock in the morning, divided into portions; after milking, between 6 or 7 o'clock, he gives the second portion; between 8 or 9, the third; between 11 or 12, the second meal for the first portion; between 2 or 3, the second portion of the noon allowance; about 4, the third.

Before milking, between half past 5 and 6 o'clock, the first division of the evening fodder; about 7 o'clock, the remainder, until the cow indicates that she is satisfied and wishes rest.

In the summer he would begin with green fodder about 4 o'clock in the morning; give, especially of green clover, frequent and small portions, until she begins to be satisfied and ruminates.

If driven to pasture, fodder once before driving, then the green foddering will be begun timely, and go on in small portions, uninterruptedly, till the time of evening. After milking, fodder out the remainder until there is an excellent desire for rest. The pasture cow must, on its return home, find the little portions of green fodder prepared for her.

He indicates strongly, also, the necessity of punctuality in observing the hours of fodder, and remarks on the size of the portions to be given, and the importance of drink, salt, the preparation of the bed, &c.

On the management of milk there are many valuable observations; as to the question, when and how often daily the cow should be milked? he says it is determined by experiment, that by milking three times a day, always taking for granted that there is equal state of foddering, there is a gain in quantity, which is to be attributed to the repeated excitement of the milk organs. But in proportion as it gains in quantity it falls off in substance, that is the fatty or creamy contents; the milk is so much the more watery the greater the quantity is. The milk of cows which gradually fall off in production of milk, is more fatty than of those which secrete the greatest quantity of milk. The additional labor of milking three times also is a consideration. If three times of the day is adopted as on the whole the best, he recommends these to be at 6 in the morning, 12 noon, and 7 in the evening, as this will bring the milking and foddering into proper connection. He enters minutely into the description of the kind of pails, pans, &c., to be used, the material,

form, size, &c., as also with reference to the milk room; enforces great attention to cleanliness in all the various arrangements and operations.

A mode of *preserving* milk from a work entitled "Il latte e suvi prodotti del Doltore Antonio Cattaneo," (milk and its products, by Doctor Antonio Cattaneo) is thus described:

"Fill the fresh milk from the cow into new glass bottles that have not been before used; stop them up with corks dipped in fat; fasten them with a wire, and then place the bottles so stopped up in a kettle, the bottom of which is covered with a layer of straw, and in which straw is placed on the sides and between the bottles to prevent them from breaking. Next fill the kettle with water and let it gradually boil. After the kettle is again removed from the fire, and the water is cooled, the bottles are again taken out and set in a cool place. After six months the milk will be found o have kept perfectly good."

Gay Lussac proved by experiments, that if we expose good and pure milk gradually to a heat of 100° centigrade, and this operation be repeated in the winter for two days, and in the warmer period three days, it can be kept without souring for two months. The use of the raphanus raphanistrum or hedge-mustard, mixed with distilled water, is said likewise to preserve milk for eight days, and the separation of the cream is prevented without any disagreeable taste for this time.

On the question relating to the quality and quantity of milk as affected by the different kinds of fodder, Von Schreiber gives the following list of articles of fodder in three classes:

1. Those articles of fodder which have a beneficial effect on the *goodness* and *quantity* of the milk—

a. Maize in a green, juicy state, i. e. at the time of its blossom.

b. Red clover, (the Brabant clover), just after the blossom heads have broken out.

c. Sweet meadow grass.

2. Those articles of fodder which exert a favorable effect on the *goodness* of the milk—

a. Sainfoin in the state of blossom.

b. Carrots.

c. Mountain meadow grass.

d. Sweet hay, clover, lucerne.

e. Mixture of vetches.

f. Coarse meal.

3. Articles of fodder which increase the *quantity* of the milk—

a. Green lucerne.

b. Rye fodder, green fodder.

c. Maltings.

d. Bran.

e. Turnips, (Burgundy and white cabbage turnips.)

f. Steamed potatoes.

g. All the articles of fodder in a very fatty state, for instance d ink of oil cake and bran.

In respect to butter, he states the general rule to be that 7½

measures of milk will produce one measure of cream, from which may be obtained one pound of butter; and closes his remarks on this subject with the celebrated Holstein description of good butter:

"Beautiful and specially good butter must be wholly free from all cheesy particles, all milk and whey and all water; must form a homogeneous mass throughout, which is thoroughly solid but not dry, and must have little appearances called lackperlin; it must be all of one similar orange yellow color of an agreeable fresh, nutlike, sweet aromatic taste and smell peculiar to itself."

The rule which Pabst, a distinguished German agricultural writer, lays down as regards the production of milk, is reckoning as the daily fodder 3¼ to 6½ lbs. of hay value for 100 lbs. bodily weight, and says we may expect 40 lbs. of milk=16 quarts for 100 lbs. of hay value. But as half of the fodder is *production* fodder, we may reckon for 100 lbs., in hay value, of production fodder, 80 lbs. of milk; and, besides, the cow will furnish one calf in the year. According to these rules of foddering, there must be on the 100 lbs. of bodily weight, yearly, a milk product of 500 lbs. A cow of 500 lbs., therefore, will give 2,500 lbs.; a cow of 800 lbs., 4,000 lbs. of milk; one of 1,200 lbs. will give 6,000 lbs. of milk. He considers the milk which will produce one pound of butter for 28 lbs. of milk as of medium quality for goodness; the proportion of cream to the milk in this kind is 12 to 14 per cent, with inferior it sinks as low as 10 per cent, and with the superior rises to 18 per cent. The general rule given is to use about 1½ to 2½ quarts of cream for one pound of butter. As the allowance which Koppe gives is 12 to 14 quarts of milk for one pound of butter, the yearly product of a cow at this rate is 1, 1½ to 2 cwt. This is stated as an average, though there are cows in Germany as well as in this country which yield a far larger product.

In Von Weckherlin's valuable work on agricultural animal production, he has devoted several pages to the subject now under notice, and given some tables which it may be interesting to quote here.

I.—Comparison of the milk product of cows of many places and in different countries.—[The maas is the liquid measure, and is about two quarts.]

Country.	Place or region.	Authority on which the statement is made.	Yearly milk production.	Kind of cow.	Quantity and kind of fodder.	Reduction of the milk product for 22 lbs. of hay or its equivalent, daily foddering.
			No. maas, 4 lbs. each.			No. of maas yearly.
Holstein.........	In general......	Alexander Von Lengkerke—Description of Holstein Schleswig Agiculture, part 1.	700	Middle sized cows	Uusual medium pasture, small winter foddering.	$897\frac{1}{2}$
Holstein.........	In better regions	Nieman—Holstein Milk Economy, p 20.	1,095	Large cows.......	Good pasture, little winter fodder.	$897\frac{1}{2}$
Hamburg........	Rich low land...	Meyer—Principles of Valuing Leases.	1,950	Large March cows	Best pasture, 180 pounds of grass daily, in winter 45 pounds of hay.	975
Hamburg........	Highland........	Meyer—Principles of Valuing Leases.	770	Small cows of 600 weight.	24 pounds of hay, the summer pasture, 21 the winter fodder, average 22 pounds.	770
Holland..........	Lowland........	Schwertz—Belgian Agriculture, 2d part.	1,050	Large cows.......	Rich pasture and good winter fodder at $26\frac{2}{3}$ pounds of hay.	840
Belgium.........	Region of country.	Schwertz—Belgian Agriculture, 2d parts.	1,390	Large Netherland cows.	Good stall foddering, with stewed fodder = $27\frac{1}{2}$ pounds of hay.	1,043
Belgium.........	Average	Schwertz—Belgian Agriculture, 2d part.	1,225	Various..	On good pasture and fodder = $27\frac{1}{2}$ pounds of hay.	980
Prussia..........	Moeglin	Thaer—Account of Moeglin....	818	Unknown.........	In summer green food, 22 pounds of hay; in winter 26 pounds of hay or equivalent.	858
Saxony..........	Moosin.........	Dr. Schwetizer — Contributions from the Domain of Agriculture, 3d vol.	830	Voightland cows, 500 to 600 live weight.	In summer green, in winter different kinds, = to 20 pounds of hay on average.	913
Saxony..........	Ponitz, in Altenberg.	Schmalz—Observations, &c., 2d 2d vol.	1,060	Large native cows	30 pounds—of hay value........	804
Austria..........	Carinthia.......	Burger—Manual of Agriculture, 2d vol.				

Switzerland......	Hofwyl.........	Schwertz—Account of Hofwyl..	1,140	Large Swiss cows	3 pounds—of hay value.........	836
Wurtemberg	Hohenheim	According to milk proving of the year 1823—1827, every month.	840	Allgauer Swiss and native cows, 600 to 800 live weight.	In summer clover, and in winter root fodder—average of hay value 22 pounds.	840
Wurtemberg.....	Lindlingen......	Milk proving of Prince Colloredo's estate for 2 years.	1,100	Allgauer and Swiss bastard breed, 600 to 800 weight.	Average of 25 pounds—hay value.	968
Wurtemberg.....	Hippelhof.......	Milk proving of Baron Calta's estate.	942	Native breed and Allgauer, 600 to 700 live weight.	Average = 22 pounds—hay value.	942
			15,060*			12,516†

* Average 1,004 maas. † Average to a cow = 894 maas.

II.—*Comparison of the results of milk production.*

MILK PRODUCT.

Breed of cow.	Daily fodder of a cow, reckoned according to hay value.	According to quantity: average per cow. Yearly.	Daily.		Highest. Yearly product.	Lowest. Yearly product.	Highest daily product soon after calving.	According to goodness. Proportion of cream. According to the milk made.	From ten maas of milk.		Butter obtained from ten maas of milk.		Fresh cheese obtained from three maas of milk.		The quantity of milk yearly, according to goodness. (1)	Product of milk on 1 cwt. of hay fodder.
					At 4 pounds each.										On maas at 4 lbs.	
	Lbs.	*Maas, at 4 lbs.*	*Maas.*	*Qrs.*	*Maas.*	*Maas.*	*Maas.*	*Per cent.*	*Maas.*	*Qrs.*	*Lbs.*	*Loth or ½ oz.*	*Lbs.*	*Loth.*	*Maas.*	*Maas.*
Holland—Friesland...	33	1637	4	2	1860 Later, 2200	1159	12 to 15 After, 16	10 to 12	......	3¾	1	6	1637	1	1637 adopted as the standard.	13½
English breeds.																
Teeswater..........	30	1228	3	1½	1312	671	8½	11	1	......	1	6	1250	1	1250	11 1-5
Yorkshire..........	28	1281	3	2	1662	1067	10	11 to 12	1	......	1	6	1300	1	1300	12 2-5
Suffolk..........	28	1052	2	3½	1128	960	6¼	12	1	......	1	6	1070	1	1070	10½
Devonshire..........	24	704	1	3 2-5	900	420	5¼	15	1	⅓	1	8	800	1	801	9
Herefordshire........	24	579	1	3⅓	604	540	7	15	1	⅓	1	8	660	1	660	7½
Alderney..........	24	965	2	3 2-5	1250	610	6	18	1	......	1	......	1100	1	1100	12½
	By loss of the stock, further experiments interrupted.															
Swiss breeds.																
Schwytz..........	30	1441	4	......	1495	1380	8¼	17	1	½	1	8	1550	1	1550	14
Uri and Hasli........	25	1183	3	1	1740	820	9¼	13	1	......	1	8	1250	1	1250	13½
Gunter..........	28	1264	3	1¾	1560	740	10	15	1	½	1	8	1380	1	1380	13¼

Murzthal breed....	25	805	2	1	945	600	6¼	14	1	......	1	[illegible]	880	1	880	9⅔
Swabian Lemburg breed.......	25	1006	2	3	1372	732	7	16	1	½	1	10	1160	1	1160	12½
Allgau.............	25	1163	3	⅔	1370	1050	8	13	1	......	1	8	1220	1	1220	13
Hungarian.....	25	381	1	......	580	150	5⅓	14	1	⅓	1	8	420	1	420	4½
Hungarian Allgau...	25	807	2													
Before 1827	......	760	......	⅓	1400	600	7	14	1	1·6	1	12	900	1	900	9¾
After 1827	......	713	......													
Average	26½	1030	2¼	......	1278	766	8	14	1	1·6	1	7	1	8	1105	11 1·6
											Or 8 maas to the pound.		2 2·5 maas to the pound.			

(1) The goodness of milk, compared with the quantity is estimated, so that one pound of increased production or butter from one hundred maas of milk reckoned by quantity, increases the value of the milk about five maas for one hundred.

The author observes: "It is not uninteresting to notice the above comparison. Thus, the product in a large average of one cow considered without regard to the quantity of fodder, according to table I., is 1,004 maas, (the maas being estimated at 4 lbs.) According to table II., 1,030 maas; the highest average product, according to table I., 1,950 maas; according to table II., 1,637 maas; but in particular animals, according to table II., 1,860—2,200 maas, besides the milk allowed to the calves.

"After all that I have observed, in actual production, far and near, the continued average milk product per cow, and by the year must be set at from 1,600 to 1,800 maas, at 4 lbs. each, and with rich fodder as the maximum on which there may be an increase in the *whole* cow race; all that is above, are exceptions of individual animals in particular years.

"According to table I., on a daily foddering of 22 lbs., reduced to hay value, for one cow of seven hundred live weight, therefore, with a yearly foddering of eighty hundred, hay value, there is produced for each head 894 maas of milk yearly, or for one hundred of collective fodder $11\frac{1}{8}$ maas of milk. According to table II., we estimate on a hundred of collective fodder $11\frac{1}{6}$ maas, which exhibits an interesting close agreement from the most diverse circumstances."

In the Transactions of the agricultural society, Essex county, Massachusetts, we find a number of statements respecting the productiveness of milch kine, which show that in this country the quantity of milk and butter obtained is much larger than in Germany, according to the statements, and the table we have quoted.

A two year old heifer, half native and half Durham breed, five weeks after her first calf, gave ten quarts of milk per day, and six pounds of butter were made from her in one week. In another case, a heifer three years old, gave from March 1 to September 15, 4,280 pounds 12 ounces, and one pound of butter was obtained from $28\frac{3}{4}$ pounds of milk. In this latter case the calf also weighed 146 pounds, and sold for $5 84. Another still is mentioned, from which, in June, from one week's milk, at ten to twelve quarts per day, was made eight pounds of butter, and in September eight quarts of milk per day, four days of which being set, produced four pounds of butter.

Of the cows which obtained premiums, the first was six years old, and from the third of June, the day on which her calf was taken from her, till the third of July, thirty days, she gave 1,291 pounds of milk, or an average of $43\frac{1}{30}$ pounds per day. A quart weighed $2\frac{4}{10}$ pounds, so that the average yield per day was equal to $18\frac{6}{24}$ quarts. Ten pounds of butter were made from her in one week.

The next one, eight years old, is said to have given in thirty days, $1,255\frac{1}{4}$ pounds, and as 43 ounces measured a quart, it gives an average of 15 quarts and a pint for each day. From 422 quarts was churned $56\frac{1}{2}$ pounds of first rate butter. Other months also yielded largely, and from 121 days' product of milk, was obtained $192\frac{19}{22}$ pounds of butter.

Of another, the statement is that from July 1 to September

28, 89 days, the yield of milk amounted to 3,186, and from 306 pounds of milk was made 15 pounds of butter.

Another, eight years old, gave from April 28 to September 28, 2,405 quarts of milk. Another, nine or ten years old, from April 25 to September 26, gave 6,122½ pounds of milk=to $2{,}448\frac{36}{40}$ quarts, or 15.71 quarts per day, and yet another, ten years old, in 11 months gave 5,562 pounds, or 2,384 quarts, in which time the amount of milk sold, 2,000 quarts, at 5 cents per quart, gave $100.

We have inserted these statements for the sake of comparison with the various estimates in last year's report, as well as with the foregoing extracts from the German journals.

It is evident, from a review of various agricultural reports, and the statements made respecting the amount of milk from cows offered for premium, that the quantity of milk used in the country, and that also applied to the purpose of butter and cheese, must be very great, more in the aggregate than hardly any one has the least idea of.

We have no precise data on which to found an extended estimate, for in none of the census returns of the States do we find the number of milch cows specified. But in the state of New York, in 1845, the amount of butter reported as made was about 80,000,000, and that of cheese 36,000,000 pounds.

Were we to allow for every pound of butter 25 pounds of milk, which is probably a low average, and reckon these at about 10 or 12 quarts, this would give 800,000,000 or more quarts, or 200,000,000 gallons of milk. But considering the proportion of milk used for butter as one-half throughout the whole State, and this would give for the single State of New York not less than 400,000,000 of gallons of milk used, besides what is applied to butter and cheese; and were this reckoned at only 2 cents per quart, would be the sum of $32,000,000, while the butter at only 10 cents per pound, and the cheese at 5 cents per pound, a low estimate for each, would amount to $8,000,000 for butter, and the cheese to $1,800,000, making the aggregate of the milk product of the single State of New York at a very low estimate at least $40,000,000, equal to two-thirds of the cotton crop of the United States.

According to the census of the United States in 1840, the number of neat cattle, including all kinds, was for Pennsylvania and Ohio each about one-quarter less than in New York. As it is believed that the number of oxen used in New York is greater than in Pennsylvania and Ohio, supposing a similar ratio to hold good, and modified by this last consideration in these two States with respect to milch kine, we may probably consider the milk product of each of the States of Pennsylvania and Ohio, then at about one-fifth less than in New York. It is very probable, however, that the proportion would be less with respect to Ohio at the present time. But, allowing it as we have mentioned, we must consider the milk products of Pennsylvania and Ohio equal to at least $64,000,000, and the aggregates for these States and New York would be equal to over $100,000,000. Were this estimate to be extended to the other States, the amount in value must be enormous.

In addition to these products, we have made no account of the quantity of milk consumed by the calves, and the value of these calves thus raised, many of which bring from $3 to $5 or more apiece.

We believe, indeed, that the increase since 1845, has been large in the State of New York and all the States, not only of the amount, but also of the value of the milk products. The rail-roads opened to market and other causes have probably affected the price, and our valuation has been placed lower than the average prices returned to our circular.

Some valuable publications on *raising of cattle*, or agricultural animal production, have been received the past year from Germany, but they were not in season to be sufficiently examined for the report; though it is hoped we may be able to add something to the appendix from these volumes, which have never appeared in English, before the report is published. Every important question in reference to breeds, influence on climate, on races, the quality, quantity of food, modes of feeding, care of the animals, economical results, &c., is discussed, and a vast amount of interesting facts derived from experiments condensed in these investigations. It is true that, in the present state of our husbandry, and furnished with the means which our country possesses, many of the details are less useful here than they are in those countries where these works are written.

But even to our own farmers these discussions would no doubt prove eminently instructive, as they present the results of scientific and practical knowledge combined, and most important hints might be gained from them. They are, however, now locked up in a language inaccessible to nearly all, and as there is little prospect that they can ever reach our agricultural public in any other way, we feel more desirous, if possible, to accomplish so desirable an object.

One of the treatises to which reference was made in the last report, that of Von Lanner has not yet been completed, and it is not, therefore, thought advisable to give it in part. But the able work of A. Von Weckherlin, "Die Landwirthschaftliche Thierproduktion," (agricultural animal production,) we have in the library of the Patent Office, and from this we may derive some extracts. In this able production, he has embodied many suggestions and views from Kuers Dietetics or preservation of the health of the horses, sheep, and cattle, which he regards as one of great practical interest to the stock breeder.

Of Von Weckherlin himself, as an author, we may quote Dr. Lengkerke's opinion, who, in his survey of agricultural literature, alluding to an earlier volume on the breeding of cattle, says: "The best and, we may add, standard or model work in its kind is that of Von Weckherlin, director at Hohenheim, who, in the most comprehensive manner, has treated this subject of the highest importance for agriculture, according to previous personal examinations in all parts of the country, with as much knowledge of the matter as sound good sense, and gives us suggestions for improve-

ments, the suitableness of which is so apparent, that they must be admitted by every candid reader, and have already for the most part been adopted by the royal government."

The importance which Von Weckherlin attaches to this branch of farm husbandry may be understood from the following paragraph:

"Very particular cases excepted, the raising of cattle should constitute the beginning, as well as the end, in the designed improvement of agriculture and its net product at the outset, in respect to the increase of manure in which the quality of the stock bred may be less regarded; but, especially at the end, when the land is once properly strengthened, in respect to quality; because the increase of income of the vegetable production finally reaches its limits, but the increase of quality, and thus the net income of animal production, scarcely has any limits." "I must, therefore, regard it as a main object of my system of animal production to furnish whatever is further adapted to the increasing improvement of the raising of animals of every kind."

He divides the means of nutriment into those of *intensive* and *extensive*. Under the *intensive* are comprehended all those which produce much inorganic stimulus, provided with highly developed animal capabilities; for example, the nervous matter, brain, powerful muscles, &c. Under the *extensive* means of nutriment, are included those of the raw product, which is of less importance, on structures provided with less animal capabilities, while yet the organism becomes more voluminous than in the former case by the increased development of the common organs, as, for example, masses of bone, hair, claws, hoofs; also fat, milk, &c.

According to the greater proportion of inferior nutritious elements, the means of nutriment exert a stronger stimulating power on animal bodies, exciting the organs of digestion to activity. The nutritious elements standing low in the scale of improvement, are their most essential stimulating substances; and the excitement produced thereby, though in different degrees, is indispensable to nourishment.

The gradations of the most common nutritious elements into which organic chemistry especially divides the means of animal nutrition, from the most common to the most improved and refined kind, and so of the strongest to the weakest stimulating substances, are:

Acids, (sharp substances;)
Bitter extractive substance, tannin;
Vegetable slime;
Fat, oil and wax;
Green sedimentary powder, and vegetable resin;
Gum;
Sugar;
Starch;
Albumen;
Gluten of the mealy seeds.

Respecting the above, he remarks that the effect of the *acids*—

as, for example, in potatoes—is to keep down the activity of the nerves. They are the occasion of powerful watery secretions in the body. The use of such food as contains too much acid produces diarrhœa. In general, such food is not readily eaten by the domestic animals.

Under certain circumstances—for example, with heat, the use of water, &c., on account of antiputrescent effect, limiting the dissolution of the juices—they may be very beneficial, and thus sought for by the animals themselves.

As to the tannin—for instance, in acorns, leaves, straw, &c.—the effect of the bitter extractive substance consists in this, that it raises the motability (activity) so that the means of nutriment, which is mixed with it in suitable quantity, becomes, in consequence, a powerful nourishment.

Grasses indicate it by their (bitter sweet) harsh, astringent taste, more than clover does; it increases the contraction of the animal fibrous system; gives to the parts more firmness, (tone,) and, therefore, is well fitted to operate against many injurious influences. Used with laxative food, it acts very beneficially.

Vegetable slime, as in oil cake or *gum*. Its effect consists in lessening the extension of the fibres, which is followed by the frequent laxness and the scanty formation of the animalized juices of the body. The means of nourishment in which it predominates do not give much strength and solidity.

Fatty oil, as in oil cake, is indeed nutritious, but is assimilated with difficulty by the domestic animals. Used in large quantities, it is followed by a relaxation of the muscular fibre and the intestinal canal. In fattening, it gives a liquid fat and soft flesh.

The *saccharine substance*, as in beets, is an easily digested, mild, but not strong nutriment, which appears to be converted into a slimy, moist substance, then fibrous matter and red blood; it therefore operates for the thinning of the juices.

The *sedimentary powder*, or *starch meal*, especially in grain and potatoes, is not only very nutritious, but also good for digestion. It assimilates perfectly, so that scarcely any excrements are secreted therefrom.

For the animal that eats plants, it furnishes a very proper substance for food. Its nourishment, when given in combination with other means of food, goes mainly to the higher organic formations, without exactly including the addition of fat slime and other inferior products.

Vegetable albumen, soluble in water, but by boiling heat, acids, &c., brought into a coagulated state, is found chiefly in large quantities in cabbage, clover, white turnips, tuberous plants, &c.; and, like *gluten*, so does it, especially in grain, in its chemical action, act entirely like animal substances. This means of nutrition, very powerful but very difficult of digestion, favors the formation of fibre. Those nutritious substances in which gluten predominates very much, easily offer occasion to inflammatory diseases.

None of these substances, how nutritive soever, if given alone, can sustain the life of the animal; on the contrary, a mixture of

many is suitable to this object. Hence arise the different opinions and the uncertainty as to apportionment of any one of these substances in the nutritious power of the particular means of fodder.

All natural means of nutriment of animals, even those apparently the most simple, consist of a combination of many of the above mentioned *nutritious* and *stimulating* elements, involved and interwoven with fibrous tissue, (vegetable fibre,) which, for the most part, resists the gastric juice and is insoluble in it—and so is not nutritious. The mechanical influence of fibre, especially in straw, on the organ of digestion of the ruminant animal, is not unimportant. All the means of nutrition with a moderate portion of the least nutritious elements are indigestible or most difficult to digest; for this reason they require, as in the ruminant, a complicated formed stomach and longer intestinal canal; and also on this account, because a greater volume must be given.

To the nutritive elements which are difficult of digestion belong, further, those which need to dissolve them the addition of many acids in the slime of the stomach, as gluten, coagulated albumen, raw starch; while raw albumen, boiled starch, the varieties of gum and slime, bitter extracts and sugar, as well as other nutritious elements soluble in water, are easily digested.

If a food is hard of digestion, the more lively function of the organs of digestion, which is requisite in addition to the vital power employed, calls for many nutritious juices; which is far less the case if, with the means of food easy of digestion, the process of digestion may go on quietly with much less exertion. Hence it is assumed that the same proportion in nutriment of indigestible means of food, generally, without regard to the kind of combination of the different means of food, will yield from 10 to 12 per cent. less than the means of food which are easily digested.

Besides, it is to be noted that it is a very common opinion that means of food easily digested are also the most powerful; but this is not universally true; for example, plants in the green state are more easily digested than in the dry. Experience also teaches us that those which are foddered green operate much more rapidly to produce corpulence than when fed out dry; but the product of the food is very different. Dry food demands more bodily strength, exerts a powerful excitement upon it, and therefore is more perfectly animalized, as during the longer chewing it is more mixed with saliva. Green and liquid food, indeed, furnishes much blood, but less animalized fluids; therefore it is not so well adapted to be rapidly converted into the superior animal formation, but operates more for the production of fat and milk slime, while the compact, firm, muscular flesh is of greater consequence for work—the more vigorous, enduring constitution. This bearing it has with many other means of food; for example, slops, mixture of grain and liquid, boiled fodder, &c., which are known to promote fattening.

We have drawn somewhat copiously from Von Weckherlin's view of food; because it presents in a small compass much that is valuable as respects the physiological operation of various kinds on the animal system, and by his close observation and practical knowledge he is

well qualified to instruct on these subjects. He considers the different modes of preparation of the nutriment—its relative value as nutritious and stimulating—which he pronounces to be very different from the absolute value that is based on chemical analysis, and on this subject quotes from Kuer, who says: "It is a pity that chemistry has taught us to know with any certainty so little comparatively of the means of food of our domestic animals." He guards, also, against the two extremes, as he observes: "It would be as faulty to acknowledge the relative value, which the means of food often exhibit only in a *single* aspect, for a *universal* standard as it would be incorrect to wish to make the absolute always to be such a standard."

In his further examination he keeps this distinction of absolute and relative in view. Under the latter head his inquiries are directed to ascertain:

a. Whether an article of food is more *extensively* or *intensively* nutritious?

b. Whether more or less *stimulating*?

c. Whether more or less easily *digested*?

d. The proportion of *volume*?

e. The proportion of *watery parts*?

f. How far after all, particularly with reference to the combination with other means of fodder, it is adapted for the different species of animals, and the object for which they are kept?

These points will show with how much discrimination and care the subject is treated. The particularities of the different animals, and the quantity and quality of food, the profit of its application, are all elaborately described, and much valuable matter educed in illustration of the various topics, and did our limits allow, many most interesting extracts might be made from this able author.

A question has sometimes been raised as to the comparative superiority of *large* or *small* cattle for the purpose of fattening. In a foreign journal we find mention of some experiments, which we have translated, and which seem to settle it in favor of small cattle. It may be different, however, with different breeds; and it is desirable that accurate trial should be made to see how far any principle can be settled on this subject. The nature of the kind of food also may exercise an influence, and to make the result more conclusive, not only this but the quantity given should be stated. We give the account, however, as it appears in the German journal from which we quote it:

Reviere, in Lesan, near Lyons, together with Von Schottfeld, a scholar of the younger Thaer, and a conductor of a farm, tried many experiments respecting the foddering of large and small cattle, and always found that the latter paid better than the former. He supposes that the value of fodder for fattening small cattle is one-third to three-fifths better than of large cattle given for the same object. Reviere made a contract with a butcher, according to which, the latter left to him every head of cattle bought by him for fattening, two and a half months, then every pound of live weight that it had gained above what it weighed when taken was

to be paid for at two silver groschen. The cattle were weighed twice, once when taken, and then at the end of the period. It was found now that according to the agreement, the butcher had to take back every third head of the larger animals, because it did not fatten enough, or at least did not repay enough for the fodder. Of the smaller animals, however, on the contrary, scarcely the twentieth or thirtieth was required to be taken back, and the gain in fattening was almost always in inverse proportion to the size. But it must be mentioned that Reviere has hitherto tried his experiments with a *single* breed, a native one in that country.

The use of *salt* used in fattening animals has excited considerable discussion, and as the results are different in different instances furnished by able investigators, perhaps it is still to be regarded as a mooted question. We have heretofore alluded to this subject in the former reports of this office.

We add now two others taken from the Oekonomische Neuigkeiten.

"Experiments respecting the influence of the common salt in the fattening of sheep by Mr. Dailly.

The experiments were tried with three wethers, of which ten had a portion of salt and ten had none in the fodder which was furnished them in quantities which satisfied them, consisting of aftermath, potato refuse, injured hay, and husks of corn stalks.

The division which received salt consumed more fodder than the other; but the difference was so slight, that computed in money for 87 days and for ten wethers, it amounted only to one franc, 56 centimes.

These animals had during their fattening, 21,750 kilograms of salt of which the price then was .076 francs. The very accurate weighings gave the following increase:

	Division with salt in the fodder.	Division with usual fodder.
1st month,	35,50 kilogrammes.	10,50 kilogrammes.
2d "	29,00 "	31,50 "
3d "	20,00 "	34,00 "
	84,50 "	76,00 "

These show 8,50 kilogrammes in favor of the division which had the salt, (which, reckoning the kilogramme of live weight, at 73,30 centimes, as the animals were sold) makes 6 fr. 23 centimes.

The increase of cost of the fodder in comparison with the other division amounted to 4 francs 82 centimes, not reckoning the salt at any expense.

The division with salt, drank during this time 533 litres of water, the other only 256.

The whole experiment gave for the division with salt a profit of 41 francs, 47 centimes, and for the other of 51 francs, 37 centimes.

The former division gave 48.13 of flesh and 5.10 of tallow for the 100 pounds of live weight; the second, 45.4 of flesh and 4.86 of tallow on the 100.

But this division is merely to be regarded as a matter of fact account; for in order that a precise view may be formed concerning the

foregoing questions, yet further experiments in the same circumstances are necessary."

The articles in the appendix of the last year's report on the breeding of cattle, by Theodore Von Lanner, will no doubt be recollected by many.

The following embraces an account of experiments on the influence of a certain quantity of salt in raising the value of fodder, by Theodore Von Lanner.

"The last winter, I made an experiment for determining the influence of increasing doses of salt on the appetite of horn cattle in the case of two lean oxen of 1,740 live weight, on about 700 pounds of flesh weight and about 5 per cent. of tallow. For two weeks these two oxen received, twice a week in the evening, per head, 3 loth ($1\frac{1}{2}$ oz.) of salt, with which both oxen consumed, daily, 34 pounds of choice hay, on an average. After this, the two oxen received the above mentioned portion of salt daily, for ten days, in which, on an average, they both together ate $40\frac{1}{4}$ pounds of best hay. With the same daily portion of salt, the two oxen consumed in the next nine days, on a daily average of $46\frac{1}{2}$ pounds of best hay, and with the same daily portion of salt, their daily consumption in eleven days more, amounted to $51\frac{1}{2}$ pounds of best hay.

Afterwards, the two oxen, for 18 days, received daily, twice the day, the usual quantity of salt, and their consumption of fodder rose on the average daily to $55\frac{3}{4}$ pounds of best hay; then they received the usual quantity of salt daily three times in the day, their averaged daily consumption fell to 51 pounds of best hay; this portion of salt thus appeared to be too large, and they were given again for 16 days the usual dose of salt once a day, on which their daily consumption, as before with the same quantity, reached the average of $51\frac{1}{2}$ pounds of best hay. The daily consumption of 34 pounds of best hay rose, therefore, with the daily dose of salt to 51 pounds, and with the twice a day portion of salt to $53\frac{3}{4}$ pounds of best hay, while, by its being given three times a day, it sunk to 51 pounds of best hay for the two oxen."

From this exhibit it is evident how important is the furnishing of a proportionate dose of salt with horned cattle, especially when coarse hard hay or much straw is foddered out."

The subject of *sheep* was so fully treated in the last report, especially in Mr. Fleischmann's report, that it is less necessary to spend any time upon it here.

Some of Mr. Fleischmann's views have been objected to, but evidently from a misapprehension of them.

In the appendix No. 10 we have placed the communication of Mark Cockrill, esq., of Tennessee, on this subject. The points aimed at by Mr. Cockrill are evidently very different from those of Mr. Fleischmann. The question is not whether in some individual place there may not be found specimens of the finest wool, but whether it may be called of a thorough and constant character; whether the degree of fineness is spread over the whole fleece, and tried by the same modes of measuring fineness and excellence as were described to be in Germany, it could stand the test. Viewed in this light, we believe

Mr. Cockrill in the wrong; and, while admitting that some beautiful samples may be and have been produced in this country, we are inclined to think with Mr. Fleischmann, that the specimens brought out by him and distributed to the different States form a higher standard than could be obtained from any fleece in this country; allowing it to be fairly characteristic of the fleece. It is a well known fact that Spain has yielded the point of superiority to Germany by seeking to improve her own breeds by importations from the progeny, at a far remove, of some of the very sheep which she formerly sent to Germany. In Europe, we believe, it is undoubted that Silesia and other portions of Germany stand at the head of the whole continent for a fine and constant character of the fleece. The reference which Mr. Cockrill makes, therefore, to undoubted merinos and individual cases of fine sheep does not meet the question raised, and he is, we think, most decidedly mistaken in the idea expressed that as good bucks can be bought in this country for $50 as those which bring 1,500 to 2,000 rix dollars in Germany.

We have deemed it proper to make these few remarks in referring to Mr. Cockrill's communication, from the belief that he has, we think undesignedly, left untouched the true issue, if any one should be raised, between himself and Mr. Fleischmann's statements. By looking at the matter in another aspect, he not only misconstrued, as we conceive, but unfortunately misrepresented the views of the able writer of the report on German wool and sheep in the last year's Patent Office report.

Mr. Cockrill's letter contains many excellent remarks, and will no doubt be found interesting to many who may read this document.

We have not received as yet the report on the *hog* crop of the west, which we have been hoping to get before the close of the report. Relying as we have done on the faithful description of this most important product by one every way qualified for the preparation of such an article, we have not made such arrangements as might enable us to present the desired facts. We trust that, before the report goes to the farmers and planters of our country, we may receive the article mentioned, and place it in an appendix No. 11.

According to the returns of the assessors of the State of Ohio for 1848, the number of cattle was 983,822; of sheep, 3,677,710; of hogs, 1,879,589; of horses, 492,509.

By a letter from one of our correspondents in Auburn, New York, we learn that a large business is carried on in that region in the buying up and forwarding to New York and Boston, by persons from those cities, on the line of railroad, of large quantities of pork.

He states that last season was the first of the business, when about 200 tons were bought up in the hog.

This season, he adds, the pork business commenced November 18, 1848, and up to January 18, 1849, two months, there had been bought 4,398 dressed hogs, weighing 1,139,522 lbs.; being 569 tons 1,522 lbs. of pork in the hog, the price of which was $4 50 to $5 50 per 100 lbs., averaging at least $5 per ton—thus making $56,966$\frac{10}{100}$

paid out for pork. He expresses his belief that this amount will be further increased during the winter to at least 600 tons; besides this, that 300 head of cattle and 200 sheep may be added, and large quantities of butter. As the business is but just commenced, it is but reasonable to suppose that it will be greatly increased, and thousands of tons before many years will thus be bought up by agents from the Atlantic cities and transmitted to these ports.

A similar state of things may be anticipated with respect to New Hampshire and Vermont, when the great lines of railroad now in the course of construction are completed, and thus the channel of communication to market made much more direct and easy and cheap.

In the Comptes Rendus for October, 1847, we find a report giving an account of a successful experiment in domesticating the Egyptian goose in France. The writer, M. Isidore Geoffrey St. Hiliare, says: "The beauty of this fowl has made it an object of request as an ornament for our gardens and parks, and it has been proved that it can live and reproduce itself in the north of France and England. We have succeeded after a number of trials, and we now possess not only a great number of individuals, but also is a true characteristic of a complete domestication of a race, truly distinct, a French one. Up to the present, at least, this race has preserved always, with few light spots, the rich colors which render the Egyptian goose one of the prettiest of the web-footed kind known; but it has also become larger and stronger.

"A more remarkable effect of the influence of the climate and of its captivity is the following: Under its own native sky, by reason of the extreme mildness of the temperature in the winter, the Egyptian goose lays towards the beginning of the year; the individuals on which we have experimented, up to 1843, according to the habitude of the species, have laid towards the beginning of January, or at the end of December; and the care of the young must thus be in the severe season. But for the same individuals, and for their progeny, the layings reported in 1844 were in the month of February, in 1845 in the month of March, and since then in April, so that the hatching takes place now in the most favorable season. Thus have been removed the worst of the difficulties which seemed to stand in the way of the propagation of this beautiful species, and we may hope that the famous chenalopex, of Greece, and the sacred fowl of the Egyptians, will, in a few years, rank among our birds of ornament, as formerly the Canada goose has become among our fowls for food."

In Bixio's Journal d'Agriculturae Pratique et Jardinage for April, 1848, we find a statement of the poultry and eggs of France, in which, alluding to actual statistics, he says: We have found 120,000 fowls for 85,685 inhabitants; and these 190,000 fowls give anuually a product of 14,400,000 eggs, or 166 eggs to a person a year. Extending this calculation to the whole of France, he says: We find that the proportion of population to the number of fowls is that of 1 to 440. Now the population of France, according to the last census, was 34,230,178 inhabitants, and thus it will

follow that, in the actual state of affairs, France feeds, by methods evidently defective, 47,938,628 fowls, which, at 120 eggs each for a year, will give 5,752,635,360 eggs, which, at 4 francs per 100, is equal to 230,100,414 francs, equal to $46,021,082 80, (above forty-six millions of dollars, allowing 20 cents to the franc.) Adding the excess of 30 eggs per fowl as the result of artificial heat, there would be 150 eggs per fowl, (12 fowls, placed in a little court without any other heat than from that of manure, laid each 153 eggs, on an average, in 1846;) this would give a general total of 3,396,931,400 eggs, of the value of 287,631,768 francs more, (equal to 57,000,000 of dollars.)

We have heretofore adverted to the vast number of eggs consumed in our country. In the replies to our circular, we find a variety of estimates; and it is evident that in many sections of the country both the fowls raised and the eggs consumed is very much larger than in others. In one day, from Cincinnati, Ohio, it is stated in one of the public journals, there were shipped 500 barrels containing 47,000 dozen of eggs. In some of the States, the poultry business appears to be much on the increase. Thus we are informed that in the region of Auburn, N. Y., where, as we have before noticed, the pork business has recently sprung up, there has been bought and sent forward 15 tons of poultry, at 7 cents per pound, or $190 per ton, making $2,100 paid out for poultry.

In the last report reference was made to the views of Liebig, and the refutation of some of his positions, by the able scientific agriculturist of Germany. Since then we have procured a very elaborate work, highly commended by the best agricultural writers in the German journals, in which, under the title of "*Thaer oder Liebig*," Prof. F. G. Schulze, of Jena, has entered upon a scientific examination of Liebig's theory of agriculture, especially that relating to mineral manures. In this volume, while he concedes high merit to Liebig as a chemist, he pronounces his method a false one, as being a *speculative* in opposition to the *inductive* one, and shows that, according to the rules of the great masters of logic in Germany, as well as the views of Humboldt, his ground is untenable.

In laying down his tests by which to decide respecting the subjects of his remarks, he points out the difference between the *progressive* or synthetic, and the *regressive* or analytic processes; under the latter or analytic process he includes the species of theories which is termed *regulative*, or relating to those theoretical or experimental sciences in which mathematical principles cannot be employed or are insufficient, and ranks chemistry among these sciences.

As the *regulative* process is the most complicated and difficult of all, hence he says it is liable to the most errors. The means of the regulative theory being induction and hypothesis, much of course depends on the character of these in conducting us to the true conclusion.

In reference to agriculture, he says: "The special science of agriculture is therefore an individual *natural science*—not an addition

merely of chemistry, physiology, &c.—not a science which a great chemist, botanist or zoologist can combine by his knowledge of the rich treasures of *his own science.* It has, indeed, for its perfection to borrow chemical, botanical, and other principles from other natural sciences; but it by no means follows, therefore, that a great chemist can be fitted, and is called to form a theory of the cultivation of plants, any more than we must suppose a great philosopher or mathematician could write a theory of chemistry, because chemistry is founded on philosophy and mathematics.

It is not a science which can be found perfectly in the writings of learned men, and the advances cannot be judged by the list of new publications, but it lives in the minds of all agriculturists who busy themselves with due consideration in turning vegetable and animal life to their objects.

Agricultural science is of so peculiar kind, that it must be studied according to particular rules. It cannot be learned from books and lectures alone, but there belongs to it also the active participation in agricultural occupations, careful observation in the great laboratory of nature, and the most earnest practice in the use of theory."

In view of Liebig's contemptuous observations respecting the agriculturists of his own country, Professor Schulze retorts upon him by the following sentence from his organic chemistry, where, speaking of the botanist who does not properly regard chemistry, he says: "They act like illiterate persons who place the value and use of the knowledge of a foreign literature the lower, and judge of it the more depreciatingly, the less they understand it; for even those among them who do understand it they are unwilling to heed." Conducting his examination of the subject under discussion still farther, he says: It is most dangerous for the chemist, not properly assured by logic, to undertake to propose a theory on the culture of plants and breeding of animals, although chemical powers indeed operate in this domain of nature very decisively. Still there are besides many others at work, the character of which is wholly unknown, so that the appearances belonging thereto can only be treated according to a combination of observations. Hence it is that the chemist, in his science, is wont to adopt only those rules for which he can give reasons; he intends merely to investigate the nature of things, not the prescriptions of a business calling. The agricultural theorist, on the contrary, in his science, has to introduce, for the wants of the practical man, many rules from empiricism—the reasons of which are yet unknown to him. On this account the rational agriculturist is much inclined to confess the deficiencies of his knowledge, and to acknowledge the dignity of other sciences. Referring to the peculiar language and nomenclature of chemistry, he adds: As to these peculiarities of chemistry, and especially as regards organic chemistry, I consider it very necessary to warn against the *false* use of the same, and then quotes from Baron Humboldt's Inquiries respecting Excited Muscular and Nervous Fibre, viz:

"On all these questions, chemistry gives us hitherto no information,

and as it answers so little, the practical physician would do better to proceed on his previous empirical method *than to endanger the life of man by the use* of imperfect theories. If the conditions are not all discovered under which a phenomenon is seen, the disregard of a single, often apparently trifling one, may so change the course of nature that exactly the opposite may take place of that which art would desire to introduce." On this, Professor Schulze says: This *warning respecting a false and premature use of vital (organic) chemistry appears to me the more necessary here, as the voice of the age is unquestionably to despise what is gradual, and to urge forward, impatiently, everything.*" He also illustrates his position by examples of gross errors, to which the false and incorrect use of chemistry has led, in which there is much instructive history, deducing his instances mostly from the science of medicine.

While rejecting the false tendency of chemistry to agriculture, he, however, admits the aid that may be rendered to be in the highest degree important, and specifies among other things the following, respecting which this is true:

"1. Without the help of chemical doctrines we cannot explain in most cases the phenomena of agriculture, and cannot know the grounds of the correctness of rules for the culture of plants, and breeding of cattle, empirically discussed.

2. Chemical fundamental doctrines belong to those leading maxims which, as agriculturists, we hold to be especially needful, in order by combined and experimental observations of nature to collect scientific experiments. Particularly we thus use the knowledge of the elements of the air, soil, subsoil, manure, plants, &c.

3. Physical philosophy, meteorology, physiology, also mineralogy, which are requisite to the foundation of agriculture, cannot be studied and farther improved without chemical knowledge.

4. Chemical knowledge is likewise peculiarly necessary for the preparation of butter, cheese, spirit of wine, beer, sugar, &c., and in general, the technical industry which is often conducted by the farmer.

The opinions which have been recently expressed by educated men, that chemistry is of no use to practical agriculture, and that the most useful theories of agriculture may be devised without any help of chemistry by agriculturists, have been induced by the excessive claims and errors of some particular agricultural chemist."

He gives Sir Humphry Davy as a fine example for chemists to follow, in his lectures on agricultural chemistry, which Thaer had translated and published with his own notes in 1814, and quotes from him the following passage in proof of his views: "When I stated that carbonic acid was found in the venous blood in the processes of life, I meant merely to say that this blood, in consequence of certain changes, became capable of giving off carbon and oxygen in union with each other, for the moment inorganic matter enters into the composition of living organs it obeys *new laws*. The action of the gastric juice is chemical, and it will only dissolve dead matter, and it dissolves it when they are in tubes of metal as well as in the stomach, but it has no action upon living matter.

Respiration is no more a chemical process than the absorption of chyle; and the changes that take place in the lungs, though they appear so simple, may be very complicated; it is as little philosophical to consider them as a mere combustion of carbon, as to consider the formation of muscle from the arterial blood a crystallization.

There can be no doubt that all the powers and agencies of matter are employed in the purposes of organization, *but the phenomena of organization can no more be referred to chemistry, than those of chemistry to mechanics;*" and again: "In announcing even the greatest and most important discoveries, the true philosopher will communicate his details with modesty and reserve; he will rather be a useful servant of the public, bringing forth a light from under his cloak where it is needed in darkness, than a charlatan exhibiting fire-works, and having a trumpeter to announce their magnificence.

That he should be humble minded, you will readily allow, and a diligent searcher after truth; and neither diverted from the great object by the love of transient glory, or temporary popularity, looking rather to the opinion of ages than that of a day, and seeking to be remembered and named rather in the speeches of historians than in the columns of newspaper writers or journalists."

Professor Schulze goes on to examine Liebig's agricultural system in general. We will quote here a few sentences from the part in which he speaks of Liebig as a chemist, to show that he has no desire to undervalue him, but is disposed to concede to the distinguished chemist his merit in this, his own branch of science. He says: "As Liebig belongs to the most famous chemists of our time, and as his reputation is especially founded on his labors in the domain of organic chemistry, we were justified in expecting much from his work—'Organic Chemistry in its Application to Agriculture and Physiology.' Indeed, Liebig has, where he has confined himself to the province of the chemist, communicated much which may be very instructive, at least for the reader conversant with chemistry and agricultural science.

We find in it many important results of investigations which have been made recently by him and other distinguished chemists on these subjects, and many successful experiments to explain certain phenomena in agriculture by means of progressive chemistry, better than had been before done." But he adds: "Liebig has, in this work, transcended the limits of chemistry and undertaken to enter as a reformer into the province of agriculture. The new agricultural system, which he builds up in it, consists especially of theories of manuring, fallows and rotation of crops." Leaving the examination of these, Professor Schulze directs his attention immediately to the examination of the *method* according to which Liebig has constructed his system of agriculture. "This examination," he remarks, "I consider the most important, because the method of the system is far higher than the system itself, and because a system with a false method is far more injurious than a

system which, indeed, contains false positions but yet is arranged according to a correct method."

"Liebig's theory of agriculture is related to that with which, after the example of *Thaer*, the educated agriculturists of Germany have been occupied as in the history of medicine the numerous chemical and mathematical systems are to the more certain method by Hippocrates of the observation of nature. It is an undertaking to produce, *merely* on chemical principles, a theory of vegetable culture which must be unsuccessful to the greatest chemists and the most talented systemizers, because this theory, at least so far as it is connected with chemistry, is not mathematical, but *regulative*, and because in it we can reach the end only by the (regressive) or analytic, not by the (progressive) synthetic course." "With reference to the logical doctrines," says Professor Schulze, "I can thus point out briefly and clearly the defects of this new theory of agriculture, viz: Its author does not proceed in the right way of the regulative theory, especially not that of the combining and experimental observation of nature, but in the false one of the dogmatic theory; he is not sparing of hypotheses, but very lavish, and often deduces from hypotheses principles which are in contradiction with agricultural experiments drawn by induction from phenomena."

As an example of the difference between the process which the educated agriculturists have pursued, under the guidance of Thaer, in theorising respecting the cultivation of plants, and the method of Liebig, he selects the theory of manuring with gypsum. On this subject he says that, according to Thaer's example, agriculturists have proceeded thus: "They strewed gypsum on young clover and observed a more luxuriant growth than on clover not so manured.

The same was the case with lucerne, sainfoin, pease, but on the other hand no effect was observed in thus manuring wheat, rye, oats and barley; and on meadows, with the exception of those on which clover, lucerne, and similar plants grew, there was no influence by gypsum on the growth of the plants. By the help of botany, the experimental conclusion was drawn from induction, that the papilionaceous flowering plants are fond of gypsum as a manure, and the rule was adopted to strew gypsum on papilionaceous flowering plants.

"From chemistry, which teaches that gypsum consists of lime and sulphuric acid, and that sulphuric acid is the combination of sulphur with oxygen, and keeping in view that many plants thrive on soil containing sulphur, the hypothesis was formed that the papilionaceous flowering plants need sulphur for their nutriment, and the phenomena of the effect of gypsum was explained far better than otherwise by assuming that the gypsum operates by its facility of attracting water.

How useful to the agriculturist was such a theory, formed by the help of the knowledge of plants and chemistry, the following facts show: The agriculturist learns by botany that the vetch belongs to the family of the papilionaceous flowering plants, and therefore

concludes that manuring with gypsum will also agree with it. An experiment proves the correctness of his supposition. Further, we find by experience, that manure of burned carbonate of lime is far more useful than the manure of unburned lime. Many agriculturists burned gypsum, others, on the contrary, neglected it, and found that the unburned operated as strongly as the burned, and thus saved the cost of burning. For this saving they were indebted to chemistry, which told them that lime became caustic by burning carbonate of lime, but not by the burning of the sulphate of lime. The chemical doctrine that gypsum consists of sulphuric acid and lime farther served as a guiding maxim in the investigation whether acid might be employed as a manure. By it was occasioned the discovery that we can promote the growth of clover with sulphuric acid as well as with gypsum.

But Liebig proceeded in an entirely different manner. He did not go upon observations respecting the manuring with gypsum, but on chemical principles, which he used not as guiding maxims, but as mathematical principles. The progress of ideas in this theory is the following:

In the soil richest in humus, the development of plants cannot be supposed without the introduction of nitrogen, or of a substance containing nitrogen, (this is the main hypothesis.) Nitrogen in the air cannot be rendered capable by the most powerful chemical process of entering into combination with any thing else beside oxygen, (this was the first subsidiary hypothesis.) The development of gluten, rich in nitrogen, stands in a certain relation to the quantity of nitrogen taken up in the form of ammonia, &c., (the second subsidiary hypothesis;) therefore, plants need ammonia to furnish them with a sufficiency of nitrogen.

The atmosphere and rain water are the sources whence plants derive their nitrogen in the form of ammonia; as now, gypsum consists of sulphuric acid and lime, and sulphuric acid has a closer affinity to ammonia than lime, so lime serves to fix the ammonia of the atmosphere, and to obtain the same quantity of nitrogen which is evaporated in the soil to which gypsum has been applied with water; hence the rule follows, that we must manure *meadows* with gypsum in order to aid the development of the *varieties of grass*, and to bring the meadows to a luxuriant growth of plants.

But this rule, so discovered, stands in direct contradiction to general known agricultural experience; that gypsum is not useful for all plants, especially not for the grass kinds, and that treating meadows with gypsum is a vain labor, the case above mentioned excepted. As it is here, so everywhere, a dogmatic use of chemistry leads the agriculturist inevitably into false measures."

"Liebig, in a later edition," says Professor Schulze, "attempted to obviate these objections by the change of some terms, using instead of *grass kinds many species of plants*, and for a *meadow*, a *field;* but, as he still retained the *false method*, the great error yet continued." Professor Schulze goes on to array a formidable statement of objections against Liebig's principles, which he supports by quotations from the works of the distinguished che-

mist, but we have neither time nor room to quote them in particulars, and shall, therefore, only allude to them in brief.

In this connexion, he says: "Whoever theorizes according to Thaer's mode may give up the hypothesis used without destroying his theory; but whoever adopts Liebig's theory, must give up his theory, with the abandonment of his hypothesis." He objects, also, that the spirit of dogmatism exhibited in the new theory of agriculture, shows an enormous self-confidence, and is evident in the paradoxes and sophisms employed, of which examples are given, and alludes to the unlimited extent which Liebig gives to his imaginative faculty, an instance of which is cited, in what the chemist says: "That the excrements of animals *are* the ashes of plants burned in the bodies of men and animals, or the process of putrefaction *is* a process of combustion."

The manner in which Liebig treats Sprengel, and others of the ablest scientific agricultural writers of Germany, is likewise adverted to as proof of the same spirit resulting from his method.

Professor Schulze also concedes that the followers, or disciples, of Liebig have carried his principles still further than Liebig himself, and instances Professor Petzholdt, whose lectures have been so highly extolled in some quarters in our country, of whom he says, "he has gone still further into a labyrinth of sophisms, hypotheses, and principles, standing in the most glaring contradiction to experience, than even his master, professing to be able, by the use of mineral poudrettes, to dispense altogether with carrying out the usual manure."

In proceeding to examine and compare Thaer's and Liebig's theory of manuring, he succintly traces the history of the subject from Thaer onward, specifying Davy, Crome, Einhoff, Korte, Hermbstadt, Schubler, and others, as persons to whom agriculture has been largely indebted for the valuable instruction they gave in reference to it. Jordan, Trautman, Burger, likewise, are honorably mentioned. He attributes to Sir Humphry Davy the merit of having first spoken with definiteness of the nutritious power of mineral bodies, and considers Carl Sprengel to have exerted great influence on the history of the theory of manures by his doctrine of the humus acid; for, although Thaer alluded to the contrast between humus acid and the alkaline substances, and to the capacity of the latter to render humus soluble, yet it was Carl Sprengel who showed that in the decomposition of humus a peculiar acid is formed, which could promote in many ways the growth of plants, especially by its combination with the bases of the humus acid salts, which he considered the means of the nutriment of plants. Sprengel's theory, supported by the concurrence of Berzelius, Dobereiner, Mitscherlich, Wackenroder, and other celebrated chemists, soon spread among agriculturists. Still later, also, Boussingault and Mulder have, by their writings, in a distinguished manner promoted the theory of manuring, as another branch of the doctrine of agriculture and agricultural chemistry.

This theory is called THAER's theory, because *Thaer* first treated

the subject soundly, and in the use of chemistry, physiology, and physics, in agriculture followed the true method.

"The agriculturist who would form himself as much as possible in accordance with this method, in reference to the theory of manure, should proceed thus: first let him collect observations and experiences respecting manure, while he bares a share on the estate in the business of agriculture and raising of cattle, and also uses for this purpose rules and written communications.

Then let him endeavor to elaborate this empirical knowledge by the help of leading principles into theoretic, while he combines the phenomena by comparison and grouping together.

Let him likewise make experiments, partly to prove the correctness of the rules given, and partly to discover new rules. The principles which should guide him in this work are:

I. Philosophical and meteorological and metaphysical; for example, every change must have a cause. The fundamental principle must be adduced, not merely in oral and written instructions but also should operate in secret. I mention this because Liebig sometimes puts it as a principle, accordant to experience, at the head of his theories.

II. Principles of experience which relate to natural science, especially chemical, physiological, physical, botanical, mineralogical, geognostic, &c. These principles, accordant to experience, are: 1st, those the correctness of which are acknowledged by all natural philosophers; 2d, those the correctness of which are yet in doubt; universal principles of experience of the first kind are those by which the combination of agricultural experiences give a higher degree of certainty to a theoretical form and the general rules of science. To this belongs e. g. the following principles of the doctrine of manures:

a. The organic constitutents of plants, namely, those which we wish to produce by the rural culture of plants, as starch, sugar, fatty oils, woody fibre, &c., consist of four elements, carbonate, oxygen, hydrogen, and nitrogen. Besides these elements, plants also contain sulphur, phosphorus, potash, soda, silica, lime, &c.

b. All elements come into plants from without; no element can be produced by means of the plants from other elements. We name the substances which plants must receive for their development, means of nutriment, and these principally consist of carbon, oxygen, and nitrogen, and besides, sulphate, phosphorus, potash, silica, &c.

c. These substances are found not only in the soil, but also in the water, and in the air. Hence the earth, water and air are the the three sources from which the agriculturist may draw by cultivation of plants, the substances for the production of starch, meal, sugar, oil, and other vegetable products.

d. All contradictory effects in the ground are produced by means of the contrary operations between the ground, water, and air, occasioned by the light of the sun; particularly vegetable life depends

on the circulation of water, which is produced by the sun-light on the water.

Knowledge of this kind is now much diffused by educated agriculturists; by it they explain for themselves many phenomena in vegetable cultivation; by it they prove the correctness of the general rules in a very simple manner, one with more and another with less clear consciousness of the same.

With these general principles relating to natural science, there are, besides, many special ones, which are likewise of certainty. By the aid of these special theories are devised, for instance, the theory of manuring with gypsum, by the aid of the chemical principle that gypsum consists of sulphuric acid, lime, and water of crystallization.

The principles of chemistry, physiology, and the other systems of nature, (the correctness of which is yet very doubtful,) the agricultural theorist of the old school uses as little as possible, and whenever he uses them, he presents them only as hypotheses which he is ready to give up as soon as the phenomena can be explained more simply and certainly by other principles. As his theory is proximately combined of agricultural experiences by the aid of general principles of the highest certainty, so they continue, though the hypotheses should be proved false by natural philosophers.

Proceeding in this way, the theory of manuring advances gradually, but surely forward.

In dividing Liebig's theory in the same manner as that of Thaer's, Professor Schulze thus refers to it:

I. Philosophical principles. Liebig sometimes uses philosophical principles, of the correctness of which every man is convinced, as though they were the principles of experience at the head of his theories; other teachers, likewise, propose these truths impliedly. For example, Liebig makes use of the philosophical principle, "every effect has a cause," in the letter in which he proposed his theory briefly to the English Agriculturist recommending a manuring poudrette. Hence his theory has the appearance to many readers of being the more solid and true.

"The cause of this defect in Liebig's method does not lie, according to my conviction, in the purpose to deceive his reader, but in the author's ignorance of philosophy, particularly of logic. If he had acquainted himself with this, he would not have explained a general law of reason as an experimental principle, nor used it as a constitutive or mathematical principle, but have known that it is a law, without which no experiment is possible—a law which one must necessarily employ as a regulative principle, in the discovery of all experimental truths."

Here, also, belongs the intimation of the principle "that the art of agriculture depends on the restoration of disturbed equivalents."

II. Experimental truths relating to natural science.

1. Those of the correctness of which there is no doubt. Liebig, uses general experimental truths of this kind, but they do not play the part in his system they do in Thaer's theory.

Thus he assumes, as every educated agriculturist has been wont to do, that plants need as means of nutriment, especially oxygen, carbon, hydrogen, and nitrogen, and also phosphorus, potash, soda, silica, lime, and other similar inorganic elements that these substances cannot be produced anew in them, but must be derived from without; that soil, air, and water, are the sources from which these means of nutriment may be created.

But the main principles on which his system of agriculture is especially built are—

2. Those principles of natural science, especially the chemical, which can now be regarded only as hypotheses.

These hypotheses and their consequences, are the principles which we shall have to examine more closely when we wish to test Liebig's theory of manuring. In the want of a logical order of the doctrines put forth by Liebig, it is not, however, easy to discover his course of thought.

From these two brief hypotheses, Liebig advances:

A. The carbon of plants is derived from the atmosphere, not from the soil, nor from water.

B. The ammonia of the atmosphere furnishes to plants their nitrogen; it is not the soil nor the water that does it. From the main principles deduced therefrom, I will quote a few.

a. Relating to *manure.*

The stable manure which agriculturists furnish, essentially aids vegetable life, only by what it contains of alkalies, lime, silica, and other mineral elements, not by what it contains of carbon, hydrogen, oxygen, and nitrogen, for these substances plants can obtain from the air, as an inexhaustible source. As now in stable manures, the mineral elements bear the proportion of some two to seven per cent. of the whole mass, so the agriculturist, who yearly brings on his fields 100,000 cwt. of stable manure, carries out 93,000 to 98,000 cwt. in vain. It would be far more simple and less costly to give the plants only mineral manures, and to leave them to acquire their organic means of nutriment from the air.

In the burning of plants, the organic, not the inorganic portions, are dissipated. Hence the agriculturist can burn his crops, namely, his straw, and yet continue his fields in the strength hitherto possessed, if he only carries on the ashes acquired by such burning. But if circumstances do not permit him to manure the plants with such ashes, yet can the same object be attained, if by the aid of chemistry he will examine into the ash-constituents of his harvest, and carry the mineral substances corresponding to his analysis upon his field. So of fallow and rotation of crops; which, as they are probably familiar to agriculturists, from Liebig's books, do not need particular consideration."

Prof. Schulze confines himself to a judgment respecting the first main hypothesis, and the manure theory derived from it.

In reference then to his hypothesis that the *carbon* of plants is derived from the atmosphere, it may be said:

"1. Liebig holds that the atmosphere contains 28,000 billions of lbs. of carbon, and by means of the life of plants and beasts, by

putrefaction, combustion of the same, and other processes, continued growth is maintained, so that we may regard it as an inexhaustible source of carbon.

2. Currents of air from north to south, and back from south to north, and currents of air from below upward, conduct the carbon of the air to plants. Of these points it is observed, "other natural philosophers have given far lower numbers for the proportion of the atmosphere. I attach no value to it, but readily grant that the atmosphere is an inexhaustible source of carbon; we should reflect, however, that plants cannot create it at pleasure, that particularly agricultural plants reach only some feet distance in the air with their absorbent vessels." The motion of the air, by which plants continually obtain new carbon from a distance, Professor Schulze pronounces a product of a too lively fancy, and Professor Schleiden, in his criticism on it, says: "Must we here adopt ignorance of physics, or a wholly thoughtless insertion of it as a cause of this monster of the wind theory?"

"3. Liebig's next position is, that humus cannot furnish carbon to plants, because—

a. Humus acid, by drying up and freezing, loses its solubleness.

b. Humus acid, alkalies, and earths, are certainly soluble in water, but by a computation in reference to humus acid, lime, Liebig would prove that rain water is not sufficient to dissolve so much humus acid as plants need to obtain their carbon.

c. If humus were a food for plants, then must the peaty soil, rich in humus acid, be very favorable to the growth of plants, but no plants particularly succeed therein.

d. Humus acid and humus acid salts do not in reality exist but only in the imagination of certain chemists, for were humus acid salts in the soil, then must the stalactites formed in the stalactic caverns contain humus acid, and have a dark color, which is not the case."

On the above, Professor Schulze remarks: "What Liebig here brings forward to justify his main principle, is only of a negative kind, and refers merely to Sprengel's doctrine of the humus acid. He seeks indeed to show that plants cannot take up all their carbon in the form of humus acid.

On this it may be observed—

a. Sprengel does not mention that plants acquire *all* the carbon they need in this way, but only a portion of it. According to his theory, plants also derive carbon from the air and water, especially in the form of carbonic acid.

b. Liebig selects for his computation exactly that particular humus acid salt, which is least soluble in water, and only brings rain water into the reckoning; had he chosen the very soluble humus acid, ammonia, which *Sprengel* declares to be the most important means of nutriment among these salts, and had he to rain water added also other water which the dew, mist and snow bring to the soil, then would the computation have proved very favorable for Sprengel's theory.

c. How Liebig can maintain that no plants grow in peat soil is

inconceivable to me. This soil, indeed, is commonly called unfertile, because no wheat, barley, and similar plants can be cultivated on it; but reed grass and bullrushes grow most luxuriantly upon it.

d. The proof in reference to the formation of stalactites, adduced for the non-existence of the humus acid salts in the soil, is without force, as indeed the precipitation of carbonate of lime, of which the stalactites consist, result from the escape of the dissolving carbonic acid, and therefore no evaporation of water is needed. But, in such cases, water does continually drop from the stalactites while they are forming themselves; moreover, in Thuringia and elsewhere, the stalactites are not usually white, but yellow, and natural philosophers observe in the stalactite caverns a mud-like smell, and a substance like humus, and have found in stalactites that, when heated, they develope an empyreumatical smell, and when dissolved in hydrochloric acid leaves little brownish spots undissolved.

4. Liebig asserts that the carbon produced by the manured land is in no greater proportion than the carbon of an equal space of land fit for cultivation unmanured, and whether planted with turnips, grass, or other fruit, produces an equal quantity of carbon. On this point Professor Schulze says: "As to the strangeness of the opinion, that the soil, whether manured or not, whether it bear rye, turnips, wood, or grass, or other fruits, yields always an equal weight of carbon in the crop, Hlubek has proved the error of this opinion by numerous passages from the experience of agriculturists and foresters. Even Liebig himself struck it out in one place in the fifth edition of his work."

"Therefore," says Professor Schulze, "I will only observe in answer to the question, How could Liebig put forth an opinion so notoriously false, and in contradiction to an universally known agricultural experience? that unacquainted with practical agriculture and its literature, he probably asked how much wood, hay, grain, and turnips, were cropped upon a Hessian morgen of the medium soil. It was answered 2,650 lbs. of wood, 2,500 lbs. of hay, 20,000 lbs. beets, 2,580 lbs. of rye; and Liebig, by computation, found an equal quantity of carbon in all these amounts. The answers and computations were right, but the question was too indefinite, for a medium soil of the golden Aue is more fertile than the best soil in the Lunenberg heaths; and land, which here gives the highest product, would not there be reckoned to the middle class, &c.

5. Again Liebig says: We every year take a certain quantity of carbon from meadows and woods, without carrying on manure containing carbon, and yet they are no poorer in carbon. Therefore, we need not manure the fields." On this Professor Schulze observes, that "it is not the case with meadows; that, if unmanured, they always yield rich harvests, but only those which are overflowed or artificially irrigated; where, neither by slime nor water, nutritious particles are brought to the plants, manuring is necessary. And because woods grow without being manured, it does not follow that grain and other plants would succeed without manure containing carbon, for trees reach from 20 to 50 times fur-

ther with their leaves into the air, and penetrate further with their roots than those plants."

Having thus examined Liebig's theory of manure, Professor Schulze next makes some observations, in which he alludes to the defects in the conclusions of the main hypothesis on which Liebig built his theory of manure, and which is found to be without foundation:

1. In that Liebig rejects the principles of agricultural experience, that stable manure is necessary for the fields, and many other rules of field culture, confirmed by thousands of years' experience, because these principles are opposed to the hypothesis of the assimilation of carbon; he transgresses against the four chief rules which Newton, and, after him, all the masters of logic, have given for the treatment of the experimental sciences.

2. In opposition to the doctrine that mineral manure, or the ashes of manure, are sufficient, and that it would be foolish to furnish them with manure containing carbon, may be adduced, not only the untenableness of the hypothesis from which it is derived, but also the following particulars:

a. The ash analysis of the chemists, according to which the proportion of plants in mineral elements, and their need of mineral manure, is determined, is in part very problematical; for instance, Liebig says of C. Sprengel's ash analyses, that they are entirely false, and deserve not the slightest confidence; and yet Berzelius, Dobereiner, and other distinguished chemists, have often acknowleged Sprengel's analyses to be correct. By what ash analyses now shall the agriculturist mix his manures?

b. But the ash analysis also, which Liebig quotes as correct, exhibit very different results. For example, the ash of a pine contains in 100 parts, six of magnesia, another scarcely any magnesia. Wheat kernels (red) examined by Fresenius, contain 31.12 per cent. of phosphate of soda, and in the other kind, by Will, (white wheat,) 0. per cent. Other examples are likewise quoted from various chemists; and then he adds: "For the formation of salts, bases must always exist, but these bases represent each other wholly or partially; for example, potash, soda, lime, magnesia; but this representation has its limits. As now, no one yet knows anything definitely respecting it; how far the bases may represent each other, so it is clear that the ash manuring theory and its artificial estimates, wholly fail in solid foundation."

c. This relates to Liebig's classification of plants, according to their mineral elements, and as the agriculturist often cultivates grain plants for straw, as well as for grain, but the grain analysis classes them with phosphate plants, and the straw analysis among silicious plants, the question is, in selecting his manure, shall he regard it as a silicious or a phosphate plant.

d. In regard to Liebig's assertion that the roots of plants absorb all soluble substances without distinction, it is remarked by Professor Schulze, that "the roots may absorb useless and pernicious bodies, and therefore, if we manure with a poudrete, according to

the ash theory, we shall bring on the soil partially useless and pernicious substances."

e. Professor Schulze objects, that allowing the want of inorganic manure to be determined, as the quantity is so small, (not more than 300 weight for a morgen,) to mix with the soil, there is difficulty of putting it on, so that the root of every plant may have its supply. Gypsum, in powder, is thrown on the plants, and not on the soil itself.

3. As Liebig cares too little with respect to carrying on carbon, so in respect to his care of mineral manures, he is much too anxious, although agricultural plants need ten to twenty times more labor than mineral substances. He does not reflect, that of the very small quantity which plants need, an important portion is furnished by nature, in water and in the air. For water passing through strata of the earth dissolves many mineral substances; then rising by capillary attraction, brings them to the plants, and the more the soil is dried by evaporation, the more the water rises from the depths.

Spring water contains $\frac{1}{3000}$ to $\frac{1}{500}$; brook and river water $\frac{1}{2000}$ of its weight of carbonate of lime, carbonate of magnesia, gypsum, silica, various phosphates and nitrates, organic matter, ammoniacal salts, and other bodies.

Brande found in 1,000,000 grains of rain water in January, 65-10, in February, 35-10 of fixed substances, as gypsum, muriatic acid, carbonic acid, sulphate of ammonia, &c., and reckoned that on a morgen yearly, by rain alone, 59¾ lbs. salts. Others reckon the solid substances which atmospheric water furnishes to a morgen at 455½ lbs.

To the dust which falls from the air, too, belongs many mineral substances. It is found that in places protected from wind and rain, the dust which falls in a year pressed together, forms ⅓ of a line in thickness; therefore, in a Prussian morgen, about 6-10 of an acre, there falls yearly 60 cubic feet or some 30 cwt. of dust. Yet if we should reckon it at 15 cwt. only, this is a quantity five times larger than Liebig's manure that is to be carried on.

In the artificial computations on the quantity of the soil abstracted by the crop, and which must be restored by manuring, the considerable quantities brought in by water and dust are wholly overlooked. Practical agriculturists should not, therefore, arrange their planting according to these computations, but according to their experience.

4. Professor Schulze urges that Liebig and his followers scarcely notice, or very little, the physical properties of humus and stable manure. They do not reflect that it often operates not less beneficially in the cultivation of plants physically, than by the furnishing the means of nutrition, particularly by attracting moisture and retaining it, loosening clay, binding sand, warming cold soils, and refreshing heated ones. If the capacity of humus to attract moisture from the air is so important in our climate, as it is maintained to be by agriculturists and chemists, the simplest standard of ertility might be arranged thereby.

We shall conclude our extracts from Professor Schulze with the comparison or recapitulation of the two theories of Thaer and Liebig, and a few notes of his defence of the humus theory:

COMPARISON OF THAER AND LIEBIG'S THEORIES.

A.—*Respecting the mode of procedure.*

1. We theorize after the example of Thaer as to manuring, proceed analytically from agricultural experience, and employ the principles of natural science as leading maxims to elaborate these experiences scientifically.

2. We found our theories, not only on chemistry, but also on physiology, physics, meteorology, and other natural sciences.

3. We especially use those principles of natural science which are of the greatest certainty, and free our theories as much as possible from the hypotheses of natural philosophers. We prefer to leave phenomena unexplained, than to make an imaginary representation to ourselves of the connexion between cause and effect. We choose to follow only rules discovered empirically, rather than those which are artificially derived from uncertain hypotheses.

4. Our theory is so simple it may be understood, and further carried out by the agriculturist who is no learned chemist, but has only pursued the study of chemistry as a subsidiary one.

5. The teacher of the old school wishes not to give the thing itself to his students, but only the right way to the thing.

6. Our theory is yet very defective, but the defect is known, and gradually it is becoming free therefrom; so that its main principles shall stand, for these consist in sure agricultural experiences.

1. Liebig and his followers proceed synthetically from the principles of natural science, regard not the experience of agriculturists, and employ those principles as constitutive or mathematical.

2. Liebig regards chemistry as the *sole* ground of a correct theory.

3. Liebig's theory is particularly founded in hypotheses. In it, phenomena are sometimes explained by imaginary representations. and rules laid down in opposition to agricultura experience, and derived from chemical hypotheses.

4. Liebig's theory is so complicated that the agriculturist can only become acquainted with it who is a learned chemist; and his followers appear to have had the purpose that none but chemists by profession should undertake and use his theory, for they project the erection of factories, in which chemists should manufacture the manures for agriculturists, and the appointment of itinerant chemists, who shall direct agriculturists in the business of manuring.

5. The teacher of the new school wishes to give the thing itself.

6. Liebig's theory imagines itself too near the point of perfection. As its main defects are acknowledged, it must fall together therewith, for these form the chief support of the system.

B.—*Respecting the contents.*

1. We assume that plants must derive all their elements from *without*, and cannot produce an element in any other way. But the elements which they derive from without are carbon, oxygen, hydrogen and nitrogen, and also sulphur, phosphorus, potash, soda silica, lime, &c.

2. These elements plants derive as means of nutriment from the earth, air and water; and, indeed, so that the same pass into their roots and leaves in a fluid form, either gas form or in form of vapor, or fluid that can be dropped.

3. The combined substances which serve plants for food, are, especially, carbonic acid,

1. Liebig and his followers assume the same.

2. The same.

3. The same. But Liebig appears to regard the air only so far as nutriment as it

ammonia, water and air. Besides, plants take up watery (fluids that can be dropped) solutions.	contains carbonic acid and other chance elements; not in respect to its essential elements, nitrogen gas and oxygen gas.
4. Grain and other agricultural plants use carbon in large quantities; for, on an average, it is 44 per cent. of the dry substance by weight.	4. In Liebig's Organic Chemistry, the meed of carbon is given as nearly as great; but he maintains that an equal extent of cultivable land produces an equal quantity of carbon.
5. Agricultural plants derive carbon from the soil, from water and from air, in the form of carbonic acid, carbonized water, and humus extract.	5. Plants derive carbon only in the form of carbonic acid, and only from the atmosphere. Young plants only are excepted, for these obtain this carbonic acid by means of putrefaction of humus and manures.
6. We must, by means of manure, bring to plants not only the so-called organic elements, carbon, nitrogen, &c., but also the so-called inorganic, as, for example, silicic acid, phosphoric acid, lime, potash, soda, &c.	6. The introduction of the so-called organic elements is the sole object of manuring with vegetable substances, because plants can easily derive the other substances, namely, carbon, from the air. Animal manure is used, also, in the formation of ammonia.
7. The nutritious elements which we abstract from the soil by the cultivation of plants, we must restore to it again. But, now as we do not actually know what substances plants abstract from the soil, so we carefully collect on our estates cultivated vegetable substances, as, for example, wood-litter, peat, and bring them upon the soil in the form of manure.	7. The nutritious elements which we abstract from the soil by plants, we must return to it; but the replacing of carbon is not necessary, but (especially) only the replacing of the so-called inorganic or mineral elements. We can, therefore, have or sell the straws cropped without any danger that the soil will become enfeebled, if we only manure the soil with the ashes of burned straw, for this contains all the mineral elements. Instead of this ash, we can also use mineral manures prepared by chemical art.
8. The rotation of crops can be dispensed with by manuring, only in rare cases.	8. By the use of Liebig's mineral manure, one can raise wheat and similar fruits every year.
9. The growth of plants is not merely dependent on manuring, but also on the state of moisture of the soil and air, and other physical peculiarities.	9. The effect of this manure cannot be diminished by different states of moisture, different localities, &c. In plants fully developed, it will not be checked by the perfect dryness of the soil.

C.—*Respecting the result or success.*

The fitness for use of our theory has been proved for fifty years by the experience of the proprietors of lands. Germany has, in a great measure in consequence of its use, doubled and trebled the rough and net products.	Liebig's theory is, to my knowledge, nowhere yet used by any agriculturist.

The conclusion, from all the foregoing extracts and statements, seems to be clear that Liebig's theory is liable to some fundamental objections. And now can the humus theory of Thaer, held by Professor Schulze, be maintained against the objections by which it is met? This is the point lastly to be considered. On this subject Professor Schulze says:

"From the comparison of the theory of manure which the educated agriculturists of Germany have followed hitherto, with the theory of Liebig, it results that they greatly err who suppose that the difference between the old and this new theory consists in this, that Liebig has proposed a new view of the means of nutriment of plants, or discovered a new source of those means of nutrition. No, the difference is to be sought especially in the *method* of theorizing; but as to what relates to the *subject matter*, the difference relates chiefly to the *manner* how plants derive their carbon.

Beside what has already been offered, the following things may serve for a justification of our theory in respect to this point: We maintain that our agricultural plants, together with carbonic acid, air, water, ammonia, and inorganic salts, also take up humus extract (organic nutriment) from the soil, and in this extract obtain a part—though only a small part—of the carbon necessary. Liebig, on the contrary, maintains that plants derive their carbon *only* from carbonic acid.

In the testing our theory in this respect three questions may be proposed:

1. Is there a humus extract containing carbon?
2. Can such an extract soak into the roots of plants?
3. Can the plants use for their object the carbon from the humus extract thus soaked in?

As to the first question, Liebig, indeed, rejects Sprengel's doctrine of the humus acid salts, which may be dissolved in the humus extract; but the existence of these salts generally, their containing carbon, and their solubleness in water, no one will wish to deny, as *Berzelius*, *Dobereiner*, *Wackenroder*, *Mitscherlich*, *Mulder*, and other distinguished chemists have declared themselves for it, and it can easily be proved by experiments.

Liebig says that the root of a plant in the earth is to all soluble substances like a sponge, which sucks up without distinction the fluids and all that is in it.

He must therefore answer the second question affirmatively, and admit that the roots bring the humus extract into the interior of the plant. The comparison to a sponge, however, gives no correct idea of the mode how the plants take up fluids, reducible to drops, by their roots. Such reception does not result from the laws of capillary attraction, but according to the laws of the so-called endosmose, and, indeed, so that the plant is decomposed at the same time it is introduced in the cells. Hence, it also happens that the interior of the root contains not a brown, but a colorless fluid. From a similar cause the liquid formed from the green food paste of the stomach in the lymphatic ducts is not green but white. Consequently, Liebig can only allege against the old theory, that plants are not able to assimilate the carbon taken up by the humus extract, but must secrete it. It would be strange, indeed, if the creator of the vegetable organism had so arranged that it should be able to appropriate to itself of substances taken up in the fluid form reducible to drops, silica, lime, potash, soda, nitrogen, and all other substances, except only carbon, which it needed in large quantities. But we are the more justified in holding to the view that our plants need beside carbonic acid, &c., also humus extract (organic nutrition) containing carbon, as the universal experience speaks in favor of it. In a soil in which all inorganic means of food are found, grows no grain, no clover, no rape, if the humus be not mixed therewith.

In consequence of violent rains in our valley of Saal, fields and meadows are often scattered over with clumps coming from Muschelkalk mountains, rich in organic matter of all kinds; but we

cannot prosecute the culture of plants in them until we have mixed therewith stable manure or earth rich in humus.

Further: it has a thousand times been experienced that marling, by which especially inorganic means of nutrition are brought to plants, will only produce a rich crop continuously, when the carrying out of stable manure is not omitted.

Hence it is the fact, that many fungus plants derive almost no other nutriment except organic sap, which they draw out of the mother plant. This is most evident in those fungus plants, the vascular system of which branches forth from that of the mother plant, as for example the *sarcophyte*, and in those in which the roots of which reach them above or below the edge of the mother plant, for example, *viscum*.

Especially worth attention, is the *merulius destructor*, a plant which feeds upon building timber, and produces in England great desolations. We might quote also the fungi, which sometimes grow on the potato.

To avoid misunderstanding, I would observe, by way of repetition, that, according to our theory, agricultural plants *do not draw all their carbon* from the humus, but only a *part* of the same. In many cases the plants take up only very little carbon from the soil, but this little we hold to be essentially necessary for their nutrition, though we are not in a situation to adduce satisfactory grounds of explanation of the action of this organic nutrition.

It is also admitted, that certain plants can live without humus, but agricultural plants do not belong to this class.

The reader who will not be convinced of the correctness of the theory, according to which most educated agriculturists have hitherto judged respecting humus and manuring, and of the groundlessness of Liebig's rejection of the same by the intimations above given, I could refer to the extended treatise of Mulder, in the seventh number of his Versuch einer algemeinen physiologischen chemie, (essay towards a general physiology of chemistry.) Mulder there treats of this subject with a decisive respect for agricultural experience, for which I honor him not less than for the solidity thus exhibited in the science of chemistry.

But with those opposers who will not be converted by a lesson of this kind, or who, from love to their hypothesis, take scarcely any notice of it, we would apply what once Zimmerman, famed as a physician and author in Hanover, said of love to hypothesis:

All kinds of prejudices may be favored through love to hypothesis; all phenomena may be bent at pleasure; we take from experience her rights; we no more hear her voice; we pervert her expressions; we are silent as to her victories; we see no more than we desire to see; instead of sacrificing hypothesis to nature, we sacrifice nature to hypothesis; one makes his observations from the desk, and imputes to nature his prejudices; others are so bewildered by the laws by which they retain their own health, and cure their diseases, that they wish to govern all men according to their laws; others, it seems, think a medicine must be regarded good in all cases, because it has been good in one. If a physician

hopes especially to see certain circumstances in a disease, he will certainly see these circumstances where he wishes, and not where they are, and we may soon mark through what glass he sees. I know a highly famous and greatly sought practitioner who has obstructions in his liver; he sees this obstruction in all his patients.

"As the agricultural chemical system has become the fashion, so probably it will be computed how many billions of pounds of carbon, nitrogen, potash, soda, &c., may be found in the water and dust of our planet the plants be referred to these new sources of nutrition, and to the air and ash theory, be added yet a water and dust theory. A lively fancy will discover hypotheses for the motion of water and dust, by which the idea that plants can at pleasure draw from these sources of nutrition, will be set aside, as Liebig has set aside such an idea by a peculiar wind theory."

It may be thought by some we have devoted too much time and space to this subject; but Liebig's works have been so extensively diffused in this country, and through their charm of style, and the enthusiasm with which the author enters into his discussions, the boldness displayed in his enunciation of his novelties, and other concurrent causes, they have exerted so great an influence in various sections, that these facts seem to justify the attempt to present, in as condensed a form as we could, with any justice to the author, one of the ablest criticisms to which his principles have been subjected in myriad-minded Germany. A few extracts from Mohl's review is all, we believe, which has been translated and published on this side in our agricultural papers. Consequently, as a part of the history of the theories and the controversy, it would appear desirable that something of this kind should be given, by which our agriculturists may have the means of comparison at hand. It is probable, but for some such method of information, they might be unaware that the real agriculturists of Germany, and scientific men in the other branches of natural science, do by no means assent to his doctrines; and how decisive is the rebuke which the distinguished chemist has met at their hands. Having in former reports presented, as among transpiring facts, the history of Leibig's views, we may claim the right of giving, too, the other side of the question, and the more so, since a right discrimination of the points is contained in the foregoing synopsis of Professor Schulze's elaborate criticism.

In Moritz Beyer's Archiv für Deutschen Landwirthschaft for November and December, 1848, we find, also, the following views respecting the true relation of agricultural chemistry, which may further aid in the object before us, of giving the state of feeling abroad on this subject. The article from which we translate is by C. F. Grimmer, of Pegau, Saxony. He says: "I, myself a disciple of Sprengel, have the following views respecting the value of agricultural chemistry:

1. That plants derive their nourishment from the soil and atmosphere, no one will deny.

2. That substances which plants seize upon for their nourishment

and thus for their growth till they are ripe, must exist in the soil and atmosphere, it is believed that practical men will admit.

3. That a continually cultivated field will finally be exhausted, and become unfruitful, is taught by the oldest experience, at least, of the temperate zones.

4. That, by manuring, the soil becomes again capable of bearing is also equally well known.

5. Hence, undeniably follows two things:

a. That plants draw a less portion of their nutriment from the atmosphere, and the greater portion from the soil.

b. That, by manuring, the substances are again restored to mother earth, which the culture of plants had drawn from it.

6. The animal excrements, the vegetable substances which promote the growth of plants by strengthening the soil, we call manures.

7. As the manure consists of a mixture of ponderable substances, but which are in a state of being decomposed, so must an equal weight of like substances be used, though these do not consist of the excrements of animals and plants, when the same are capable of decomposition in the soil, and *when, in the use of the same, repose is left to the soil until the decomposition has taken place.*

8. As animal manure (by the improvement of the science of chemistry,) has been analyzed, we know its elements; we can, therefore, collect and combine these elements from the mineral and vegetable kingdoms.

9. When the elements are first decomposed in the soil, it needs the mixture of a fermenting substance, by means of nitrogenous parts, and the conditions in which only the fermentation can there take place, of the entrance of air, proportionate moisture, a certain degree of warmth, as well as (necessary) time for fermentation.

10. Chemistry, teaches us what are the elements of the plants, soil, manure, atmospheric deposites, the change of substances in decomposition, of animal, vegetable, or mineral elements; and hence it follows, that it is not owing to chemistry in its present advance, but to the defect of applying it, if even where it is not empirically employed there have not been derived therefrom more manifest results.

11. The failure is two-fold; the chemists, with a few exceptions, are, for the most part, mere theorists in agriculture, while they attach to chemistry a higher value than now, at least, it can apparently have in practice; and their opponents are to blame that they do not understand how to avail themselves of its true value.

We have over wide tracts of country fruitful and poor years. During the so different years the fields are planted in the same manner, manured alike, and yet a poor field may bear well in a fruitful year, and a rich field little in an unfavorable year. There are therefore yet other conditions for the success of plants than *merely* the presence of the nutritious elements in the soil.

Practical men fail in the following respects:

a. As to liquid manure, or manure which is carried out in the form of a dry powder, and of straw manure, either of them placing

the land in a *different mode* of mechanical looseness or tightness. But every plant requires a particular degree of looseness or tightness; one soil is not equally preserved with another by a similar treatment. They should, therefore, in the use of artificial manures, keep in view another cultivation; of this I have a decisive proof.

A proprietor who is deficient yearly in animal manure, hears of the effect of bone powder. He buys it, strews it on his fields, but it is of no assistance. But the want of manure continuing, and constant favorable results elsewhere of this manure, cause him to make further trial, and he succeeds, as he does it with proper tillage of the field.

b. Agriculturists have also failed in this, that they have not allowed the manure time for decomposition, by which it is first brought into a state in which it can serve plants as nutriment. They usually avoid paying money, therefore, till there is the highest necessity; they then strew the fine powder in the furrows, and now think it may be taken up by the roots of the plants, and, as it were, swallowed and pass through them into the plants by the process of digestion. But this is a mistake! Experience has often clearly taught, that 8 cwt. of bone powder put on the stubble of the previous fruit, produce as good a result in crops as 12 cwt. which is put in the seed furrows. We must hence bear in mind that dunghill manure contains a large portion of water, (70 or 80 per cent.,) which promotes its decomposition from the moment of its being plowed under. Artificial manures, on the contrary, are put on the field in a dry state. Rain or snow must impart to them that moisture which is necessary in all cases to begin fermentation. The decomposition will then first *commence*, and hence, necessarily, there should be a longer time for its full development. It is proper, therefore, first to mix all dry manures with a heap of earth, moisten it, work it over from time to time, and use this compost on the field.

c. The agriculturist also fails in this, that while he is acquainted with neither of the elements of the soil, nor of the fruits to be cultivated thereon, he does not know what manure is peculiarly wanting to his soil, and what he should especially procure, in order to give to the fruits which are cultivated the requisite nutriment; as no *artificial manure by itself alone actually combines the elements of the manure of the dunghill*. The most perfect manure, although it cannot, in this respect, be properly called artificial; is the oilcake of the rape-seed.

The *chemical analysis shows this*, and *practice* in Belgium and Holland proves it. Why do not the agriculturists buy this oilcake, mix it with moist earth, moisten it and heap it up in piles, according to the different periods, and strew the mixture on the kind of crop in their region for which it is most adapted? Because it seems to them too dear; because, if their dunghill fails, they choose to let their fields go poor, and *will not pay as much for an artificial manure as they would pay for that of a dunghill, if they could obtain it.*

Next to the oilcake stands bone-powder, only it is deficient in

potash and sulphuric acid, which may be added to it. Saturated preparations of flesh, blood, and earth, containing humic acid, succeed to this; but the *management of the soil*, and the mode of use of *these manures* on *his soil*, every agriculturist must learn for himself. *This no chemical method can teach him.* It hence follows, that the use of the more simple substances, as those of saltpetre, gypsum, vitriol, alum, &c., are wholly uncertain, and must everywhere give more or less defective results.

In a word, the science of chemistry and that of Agronomie do not yet enough go on hand in hand. *Chemistry cannot alone produce the benefit.* This is my view of the matter, grounded on twelve years' experience. It is practical; and others may use it as they please."

In the same journal, we find some sensible observations contained in an essay by Leo Meier, a chemist at Creutzberg, in Prussia. His article is entitled, "What has Practical Agriculture to expect from Chemistry?" and we shall gather a few extracts from its pages. Admitting the high character of Liebig as a chemist, he at the same time also admits that he has failed in many of his points upon agricultural chemistry, for want of more general science and in consequence of not being a practical agriculturist, botanist, zoologist, &c. Examples are cited of cases in which the agriculturist has been subjected to severe losses from a similar want of discrimination or ignorance of chemistry, when under the influence of the enthusiasm produced by Liebig's first announcements of his doctrines, application was made of the prepared manures.

One was the case of a man, who, having heard that the scraping of horns would much enrich the land, thought that instead of applying these, it would be still better to take the horns and hoofs whole; and as his own farm did not supply enough for his object, bought up a large quantity and ploughed them into his field, of course, deriving no benefit from the same. His next experiment was with the scrapings, but with hardly better result, because he employed these without any reference to the foregoing crop. These instances he cites in order to show the necessity of exhibiting the true relation of chemistry to agriculture. He says, "When we turn to chemistry and examine what results the agriculturist may expect from it, since this chemical vertigo has not wholly quit the heads of men, we must first take a glance at vegetable life. Plants have a relation to the soil, the atmosphere, and atmospheric temperature. In respect to this last, the art of the chemist is at an end, for the subtle heat cannot be detected by the most susceptible scales of even Liebig himself; and so we can here only consider it with reference to the soil and the atmosphere.

The soil is the storehouse from which the plant derives the greater portion of its nutriment; these means of nutriment, for the most part, consist of mineral bodies, and here it is that chemistry has furnished the proof that these bodies really belong to the plants, for it has indicated them in the ashes of the burnt plants.

But the praise is due to practical agriculture; it had by a variety of experiments shown that these bodies really serve for means of

nutriment, as, long previous, it had made use of gypsum, marl, phosphate of lime for manure; and long before chemistry had meddled with agriculture to promise it prosperity and favor, and indeed, long before chemistry was known by name.

The chemist has also detected these bodies in the soil, but the benefit which they afford to plants he has not indicated.

Beside these bodies we find in the soil also others: namely, those which are considered organic, as humic acid, humus extract, ammonia, which serve as nutriment to plants.

Of these, Liebig maintains in his famous work that plants must take them in a great measure only from the air, and, therefore, it was not necessary to furnish them to plants by manures. The author declares that he himself had opposed this view from the first; because it was not sustained by fact, notwithstanding the theory appears so finely on paper; and that, in respect to the large proportion of ammonia in the air, it had already been combatted by another chemist, Mulder. He then adds: "Here I cannot help noticing the wavering and incorrect points of Liebig's views; for, should an agriculturist practice upon them, and manure his fields only with mineral bodies—for example, gypsum, marl, or the phosphate of lime—and wholly neglect the usual manures, with their carbon and ammonia, he would very much lessen his crop."

"The agriculturist may thus see that he cannot do otherwise than to have plants treated by the culture which is suited to their natural states. Nature has bestowed on the earth, beside mineral bodies, also organic, which may serve for nutrition; and without these the former do not exist, though it is a matter indifferent to the agriculturist whether the carbon is brought to the plants through the roots, or by carbonic acid which the bodies found in the soil containing carbon produce by their putrefaction and diffuse in the air, and by absorption through the leaves thus reach the plant. We therefore conclude that it is impossible to neglect stable manure, but that we must apply it to the fields. Yet this circumstance at the same time furnishes proof how necessary it is that the agriculturist should carefully examine, when anything new is recommended to him, whether the new method is not too far removed from the operations of nature; for, if this is the case, then he may be convinced that it will be of no benefit, but rather of injury to him.

Beside these elements of the soil, which serve plants for nutriment, other bodies also have an influence on their success, the operation of which is partly mechanical and partly physical. I mean by this, the peculiar condition of the tilled soil is dependent, in a great measure, as regards the quantitative proportion of elements on the different kinds of earth, or the elements that contain carbon. Nothing now appears easier than to determine the elements of the soil by a chemical analysis, in order thus to be able to form a conclusion as respects its goodness and fertility, if there were not manifold difficulties in the way of such an undertaking. The greatest of these difficulties consists in this, that on the space of a certain extent, the elements of the soil do not remain equal in all

places of this space, but vary as well in respect to their quantity as to their quality.

If, now, we would examine the goodness of the soil chemically, nothing else remains than to examine the soil at least on eight or ten places on a space of two morgen, (or some three or four acres,) and from the results found deduce a mean, and thus to draw the conclusion respecting its general fertility. For the examination of a single place might lead to very erroneous conclusions. The place examined, might, for example, have an excess of nutritious substances, while other portions of the tilled soil might be deficient in them; and this might easily cause a person to mistake, by estimating too highly its fertility, or vice versa.

But to conduct these examinations as I have suggested, would demand not only time and labor, but also be expensive. But all these difficuties the agriculturist avoids, when he values the goodness of the soil of a piece of land, according to the signs which the appearance of it offers him; or still better, when he rests on the experience of his predecessor who has tilled the same land. A chemical examination appears to be advisable only in a single case, in which a piece of land not before cultivated is to be brought under tillage, or in which a field that has for many years lain fallow is to be again sown. But even in this case the agriculturist has at command signs from which he may conclude with much certainty as to the fertility of the land to be cultivated. These consist in the knowledge of the condition of the soil which his examination of it by his eye teaches, and the state of the grass-growth on the piece of land.

There is likewise one other case in which the chemical knowledge of the soil must be of unquestionable advantage, when the state of the field to be cultivated anew appears not to be bad, but the scanty grass growth on it is only correspondent to a poor capacity for cultivation. In this case the chemical analysis may furnish the agriculturist the means to ascertain what elements must be added to make the land fertile. But allowing that an agriculturist has convinced himself of the fertility of a piece of land by chemical analysis, and has no regard to any other circumstances, he may by such an analysis often be led into great error, for it may chance that the same sub-soil, though it is in a very good state, yet in different regions, possesses a wholly different fertility, not only if it does not contain an equal proportion of all the substances serving for nutriment, but even if, also, it consists of a quantitative proportion of clay and sand, which is very favorable to the success of plants. What influence the sub-soil may have on fertility is known to every one. Hence it may happen, that a fertile soil, by means of an unfavorable impervious sub-soil, may be little adapted to cultivation, and a less favorable soil may be very much improved by a good sub-soil.

In the same manner a soil which ought, according to chemical analysis, to be in the highest degree fertile, yet, on account of the water rising through the bottom, may be so poor that it does not repay for tillage; and the same soil exhibits wholly different de-

grees of facility for cultivation, according as it lies on a plain, or on the south side, or forms the slope of a hill, where it may be more heated by the rays of the sun falling directly upon it.

We see, therefore, that chemistry affords almost no benefit to the agriculturist in the investigation of the goodness of the sub-soil, and seems to be almost superfluous to this purpose.

As the best means of nutrition for cultivated plants are found in manures which we carry on our fields, we will then inquire how far chemistry can exert any influence on these to benefit the cultivation of the land.

The knowledge of the best effect of manure on plants we owe, not to chemistry, but only to the practical experience of the tiller of the soil. Science, indeed, came in afterwards and showed what elements were imparted to plants by manure; but the effect of the same was known long before any one thought of chemistry; and this last knowledge is, naturally, only of special use to the agriculturist.

We may divide the manures into animal, vegetable, mineral and atmospheric; and we will now see what influence the knowledge of chemistry has on one of these kinds. The usual manures consist, in their principal elements, of animal and vegetable substances. We will, therefore, consider at the same time animal and vegetable manure:

A very effective element in the common manure of the dunghill, is the volatile ammonia which is produced in the putrefaction of the same, which, in the usual treatment of manure, for the most part, escapes into the air, and of which, probably, the dried manure of the dunghill contains but a small per centage. Experience now teaches us that fresh manure, in its putrefaction, developes ammonia; that it is more efficacious than old, dried up manure; but it does not teach us how a person should retain and fix this precious substance in the dunghill. This is matter for chemistry, which makes the agriculturist acquainted with the substances to be added that possess the desired properties; and this is really a merit belonging to the chemist by which he may conduce to the greater prosperity of agriculture.

We frequently find the opinion prevalent that if a person carries out his manure on his fields in the winter, in order to plough it under in the following spring, this procedure will not diminish its value. But chemistry would prove to the agriculturist that this management is faulty, because by the rain and snow water a quantity of effective elements are removed from the manure which, in the spring, runs off with the water in the yet frozen ground, and thus is lost to the field.

The effect of green manuring is universally known. But chemistry has taught us that this effectiveness is to be sought, not in the mineral substances which the plants plowed under give to the soil, because they in their growth derive the same from the soil, and only afterwards restore it again, but in something else; but this other substance especially is ammonia developed in their putrefaction, and which reaches the plants in a great degree through the atmosphere. It follows, therefore, that the green manuring must be so

much the more powerful if we make use of those plants which, in their putrefaction, develope more ammonia than do others.

Hence vetches are better adapted to this than mere grasses. But at the same time chemistry clearly shows that the manuring by the stubble left on the field after the grain has been reaped, can have only a very insignificant effect, though the opinion is pretty generally diffused that its influence on the future harvest is no unimportant one; for the stubble, in its putrefaction, yields only a small quantity of ammonia, and, hence, the field does not long retain the mineral substances which were derived from it in the growth of the plants cultivated upon it, because the greater part of them were drawn out by the grain and the straw which has been cut off.

Chemistry also rectifies another generally diffused preconceived opinion. It is believed generally that by the excrements of the cattle, which they leave in feeding on the pasture or stubble field, its condition for culture is improved; but those conversant with chemistry know, at the same time that only that is given back to the soil which has been drawn from it.

Further, on most farms there is a most thoughtless practice with regard to the draining of the dunghill, which is exceedingly valuable as manure; because it is not only allowed to run off unused from the stalls, but, also, what is separated from the dunghills is not collected in reservoirs. Although, now, practical experience has sufficiently proved that the efficacy of this material for manure is to be valued highly, yet it is chemistry only which teaches the agriculturist how he can increase this efficacy by the addition of other substances, and how he, in general, must manage it in the most suitable manner.

Chemistry it is, further, which teaches how we may proceed with materials for manure which are not generally in use—as human excrement, for example—so that we may obtain all the manuring elements, and lose none of them. It also teaches the agriculturist that in manures certain substances must not be wanting, if it is to be effective, as the different plants, beside carbon and ammonia, which they all need, require also different mineral substances for their success. Therefore, an agriculturist should understand agricultural chemistry in its rudiments, not to fall into errors; as to wish to manure his fields with pure excrements—for example, those of horses—without mixing in straw; as, indeed, many do fall into this mistake, who thus think by this method to carry upon their fields a truly powerful manure; for such a person does not know, assuredly, that a most necessary element, silicate of potash, will be drawn out of the soil. Such an agriculturist must not, moreover, manure his fields with mere poudrette, bone powder, or guano, without having first mixed it with the usual manure—an error into which farmers fall, because they are of opinion that these substances, which have acquired considerable reputation as materials for manure, are in a state alone to provide their fields with the necessary elements.

All this which I have here cited respecting animal and vegetable manures, may be sufficient to show that the practical agriculturist

may, by chemical knowledge, exert an influence which must be greatly to the advantage of his fields.

As to the materials of manure which furnish mineral riches, it is not to be denied that the favorable operation of gypsum and marl was known long before the agriculturist busied himself with chemistry; yet, in the employment of these materials chemical knowledge is not without use. The principal means, indeed, of recognizing marl—namely, its effervesence when an acid is poured upon it—is of chemical origin. Farther, it is not a matter of indifference to those who are conducting agriculture, how much per centage of lime which the marl one wishes to use contains, as the proportion of lime in the same is very different, and by this the quantity must be decided which is to be carried on a certain surface of his fields. But chemistry only can give him conclusions as to the proportion.

Further, many springs of water contain a quantity of carbonate of lime in solution, so that where such water is in a state to flow over a field, we can marl the same. So, too, many springs of water contain a quantity of gypsum, and we can, therefore, use them to advantage for a gypsum.

That the usual tilled ground is derived from the influence of weather on stones, especially of granite, is also known; chemistry has, moreover, proved that the tilled ground likewise consists of the same elements as the stones. Hence we may assume that stones, especially if easily acted on by the weather, are no disadvantageous appearance on a field, for they may, though many of them also are very scanty in the proper material, furnish the field with elements of manure.

We see, therefore, how profitable it may be, if we heap up stones on the borders of the ploughed ground, and take care of them, that the rain water flowing from them may reach the cultivated field.

Chemistry also may teach the agriculturist that he can often use to great profit the minerals which he has not yet employed for manuring, especially if they are found in quantity on his estates; this may be the case, for example, with calcareous tufa, which in its principal elements is carbonate of lime, and therefore may have as favorable an effect on plants as marl.

As to what concerns the atmospheric materials of manure, carbonic acid and ammonia diffused in the air, the efficacy of the same cannot now be further increased by aid of chemistry, for it is universally known that its fertility is increased by the turning up of the soil by which its ammonia is absorbed, and that water containing carbonic acid operates on silicate of potash in the soil to decompose it. It was also known that when turfy soil is exposed for a long time to the operation of the air it becomes converted into a very fertile mass of earth. But all this is the result of experience, and chemistry has first afterwards made us acquainted with the processes by which these changes have been wrought.

If now we turn to the consideration of the plants of culture, in so far as agriculture can operate on their success by the help of

chemistry, we know that chemistry has acquainted us with their elements, but especially with those which belong to the mineral kingdom, of which only we shall here speak. We have learned to know of them that some contain silicious earth, others calcareous, and again others potash, and hence conclude that according as the soil is rich in one of these substances the plants adapted thereto especially succeed, and vice versa; that plants only advance poorly on a soil if it does not contain the substance which it mainly requires for its nutrition. Therefore good fruits are peculiarly successful on a soil which is rich in lime, because their ashes contain much lime, and they particularly need this substance for their nutriment. Hence, also, the good effect of gypsum on clover, &c. But by this the agriculturist may have a means at hand to improve his fields, on which especially a single species of fruit will not advance. For a field on which peas do not particularly succeed is certainly deficient in lime, and therefore lime should be furnished to it. A field on which the haulm fruits decline, is wanting in silicate of potash, because the grass haulm contains much silicious earth, and much of this earth is needed for its full development. We must improve such a field, therefore, either by a rich quantity of straw, which is added to the dunghill manure, or by slacked wood ashes, &c.

But the knowledge of the mineral substances of the ashes of plants may be of great advantage in another respect; in the case where the agriculturist wishes to attempt the cultivation of a plant, as to the culture of which he does not possess sufficient experience; for he will easily be able to judge from the ashy elements what means of nutrition the new plant particularly needs, and how to average his materials of manure accordingly.

From this view, we may see that the much too great expectations which have been formed of chemistry in reference to agriculture, since the announcement of Liebig, must be called altogether excessive, and that it is the greatest injustice as well as an unpardonable arrogance on the part of the chemist, if he wishes to be regarded as the instructor of the farmer, and denies him all intelligence in the practice of his business, and maintains that agriculturists have been mere empirics; for a man may be an able practical agriculturist without, on this account, understanding anything of chemistry, as this also our predecessors have sufficiently proved. But this much stands firm: that chemical knowledge is in the highest degree useful to the agriculturist, if he uses it with understanding and prudence, and thus regards all the circumstances which are connected therewith. Especially he may be convinced of this, that without gypsum it would hardly be necessary to obtain artificial or far-fetched materials of manure, as for example, guano; because in a suitable preparation and use of the manuring powers which his estate offers him, he would not be compelled to buy any for money.

If we take into consideration this and all that I have said in favor of chemistry, then all this must force on us the conviction that this science may be, and will so continue, not without influ-

ence on agriculture, but that in succeeding times it may yield much for the further development of the same.

In this subject, therefore, namely, the influence of chemistry on agriculture, the truth lies in the middle; i. e., we must not form too great hopes, but we must not set it aside as wholly unnecessary.

But besides this advantage just mentioned, there is yet another which certainly cannot be regarded as one of low value.

Chemical knowledge places the farmer in a situation to judge correctly of all the experiences with which he has become acquainted in his practice, and thus to investigate the cause of every appearance. It is impossible by this to conclude from one appearance to another, because similar appearances are wont to have similar grounds in a word, such knowledge will make his reflective powers more lively and himself more intelligent."

With all due allowance for any bias the above author may be supposed to feel as a chemist towards the science of his profession, we believe that in the main his remarks may be taken as a fair statement of the position chemistry holds as to agriculture, and confined within these limits in its claims and pretensions, it may be of great benefit to the practical agriculturists of our country. This is the view it is believed, too, that the ablest scientific teachers of agriculture in this country would adopt.

In a lecture by Prof. Johnston, delivered before the society at the meeting in York, on the present state of agriculture in its relations to chemistry and geology, and which was published in the Journal of the Royal Agricultural Society of England for August last, we find much valuable information; and, as it may probably be seen by few of those who read these pages, we will transfer some portions of the same to our report. His remarks are in answer to the three questions—

"*First.* What has been the progress, in amount and in kind, which scientific agriculture has made among ourselves during the last ten years?

Second. What is the actual condition of this advancing knowledge? and

Third. What should now be specially done to further or make easy its advance?

In answer to the first question, he mentions the state of things as they existed ten years before in reference to the want of correctly ascertained facts in experimental agriculture; the currency in theoretical writings of a crowd of hasty hypotheses; and the wide gaps and deficiencies which everywhere presented themselves in analyses of matters connected with rural economy. To meet these deficiencies the proper remedies were suggested, to have accurate experiments in the field undertaken, made by weight and under varied circumstances, and instructions were published explaining the kind of experiments desired, how they should be conducted and the ends they were expected to serve; also to reject received views of every opinion no matter by whom propounded or propagated, in support of which there were not unmistakeable facts, or in favor of which the balance of known observations did not dis-

inctly incline; and lastly, that analytical researches of various kinds should be undertaken in the laboratory.

In reply to the second question propounded, he says: That much has been done as to experiments in the field—many of which were conducted and are apparently accurate in their character. From these experiments he draws the following deductions:

"*a.* That substances rich in nitrogen increase the verdure, lengthen the straw, and generally promote and prolong the growth of plants.

b. That lime in its more common forms generally shortens the period of growth, strengthens the stem, and hastens the time of ripening, both of the corn and the root crops.

c. That certain saline substances applied alone, and even in comparatively minute quantity, produce a remarkable, what may almost be called a marvellous effect upon certain crops on certain soils.

d. But change the crop or soil, or the season, or apply them in the same circumstances a second or third time, and frequently no sensible effect will follow.

e. That where one substance applied alone refuses to produce a visible effect, a mixture of two or more may give rise to striking differences.

f. That phosphoric acid, lime, and certain forms of organic matter are essential constituents of such a mixture as shall everywhere and in all circumstances produce a marked and beneficial effect on old cultivated land, to which no other manure is applied."

These general deductions, professor Johnston says, are important bases for future practical researches, and the certainty thus attained in regard to them is worth perhaps all the cost of the experiments. Other conclusions likewise are mentioned, which may be regarded as *probable*, as for instance:

"*a.* That the so called soluble saline substances, the salts of potash, soda, magnesia, &c., are grateful to the root crops in which they exist largely.

b. That those which contain sulphuric acid have a specially beneficial action upon leguminous plants.

c. That the use of common salt adds weight to the grain.

d. That on mossy land the use of bones tend to fill the ear.

e. That lime and salt are better than lime alone on some soils, in giving strength to the straw.

f. That mineral manures applied alone, act like lime, in shortening the period of growth."

These probable conclusions he considers to be of value as guides to the practical man, but to science they are almost invaluable, as they point the way to new experimental researches, by which the domain of truth will be enlarged.

He comments on the defect of experiments which often have been undertaken without a definite purpose, and without a clear knowledge of what was to be looked for. Thus, points have been passed over important to be observed. In cases of contradictory results or discordant statements, no means are afforded for determining on which reliance is to be placed. The soil or the sub-

stance applied to it has not been analyzed; the history of the past treatment and present condition of the land is not given; the peculiarities of the weather, or of the local climate, are not noted; the physical geography of the neighborhood is left out of view; the character, willing and attentive, or otherwise, of the workmen is not stated, or we know nothing of the general habits, skill, and education of the person who publishes and is responsible for the accuracy of the whole results."

The defects noted with respect to experiments on specific manures are, that the limits of the natural differences in the crop on different parts of the same field have not been previously or simultaneously determined. One portion of the field has been left undressed, and the produce of that one part has been taken as the standard with which the produce of the dressed or manured parts were to be compared. As evidences of the necessity of such cautions respecting experiments, he says: "The same substance applied in the same quantity to different parts of the same field and crop produces differences of an equally marked character, of which examples are given. Now, are these differences to be ascribed to the errors or carelessness of experimenters or their servants? or do they signify that no exact numerical results are ever to be obtained from such experiments?" He considers that whatever be the cause, inasmuch as the tables of results at present possessed exhibit for the most part only one illustration of the effect of each substance or mixture employed, no strong reliance can be placed upon them as indications of what their mean or average effect would be on the field as a whole, or upon its several parts taken singly.

And in reference to the experiments made, he adds: "But the application of these and other tests has compelled me to the conclusion that a very small number indeed, out of the host of experiments made during the last five years, is really deserving of more than a general credit. They are to be trusted as showing that this or that substance adds to the verdure, bulk or weight of this or that crop, in certain circumstances; but they are not to be depended upon as to how much these several substances do so either relatively or absolutely, or as to the degree by which their action is effected by this or that circumstance. In other words, the application of weight or measure in its strictest sense to this branch of applied science has yet to be made; and the field of precise agricultural experiment, instead of being pretty well colonized, as some think, may be said to lie still open and unoccupied before us."

But, says Professor Johnston, have our past experimental researches, then, as a whole done no good? And he replies: I would say, they have all done good. In some cases certain and probable deductions have been made, as already stated. But even in other cases, and where no such deductions can be drawn from them, he thinks that the labor spent on them has not been lost. He adverts to results embraced in calling forth so much new thought, the definite form and meaning imparted to the idea of scientific farming, the new habits of observation created, the more precise modes

of reasoning secured, the amount of reading of books which otherwise might not have interested the agricultural class, and their co-operation in associations whose motto is "science with practice."

Even in the very sense in which the experiments made are defective, that is a purely scientific one, as supplying reliable facts on which to base opinions, or to be employed as tests of opinions already entertained, he still deems them as not without their use. They have taught, he says, how to work more correctly, and have called up and trained men who are capable of performing experiments in future years.

In remarking on the manufacture of mineral manures as a circumstance which distinctly marks the kind of advancement which scientific agriculture has made of late years, and the position it now occupies, he says: The possibility of concentrating great fertilizing efficacy in a small weight or bulk, has been satifactorily demonstrated to every one by the remarkable effect of guano. Chemical analysis then took it up, explained the composition of guano, declared that it could be imitated at a reasonable rate, and published experimental recipes for compounding artificial mixtures to be tried against it. This, he states, led at once half instructed men to press forward into what appeared a sure and easy way of making money. The consequence was, that numerous worthless compounds, or at least very inferior to guano were sold and bought by credulous farmers, who found themselves greatly disappointed in the promised results. The farmers were indeed partly to blame, as they encouraged the sale of cheap manures. The way to check this state of things, Professor Johnston observes, is to diffuse among agricultural improvers generally, that limited amount of instruction which shall enable them to manufacture the mixtures desired for themselves. That this practice is on the increase with respect to bone manure is evident from a single fact stated, that in the town of Spaulding 27,000 lbs. of sulphuric acid were sold last year for the purpose of dissolving bones.

Professor Johnston says, that in addition to the experimental and directly practical part of the progress made, as the one which plainly bears on the profitable prosecution of the agricultural art, there has been considerable improvement in regard to agricultural theory within the last five years. Thus:

"*a*. It is known that the bodies of animals contain much nitrogen. This nitrogen they obtain from their food, and this food is all of vegetable origin. Now vegetable food is believed to be more valuable for the production and support of those parts of animals which contain nitrogen, in proportion as the per centage of nitrogen present in itself is greater. It comes nearer to the composition of the animal parts themselves. It has also been long received as a practical truth, that the proportion of nitrogen in wheat and other kinds of grain was very much under the control of the cultivator—that by a proper adjustment of the quantity and quality of the manure he could halve or double at pleasure the per centage of nitrogen contained in his crops of corn." Numerous experiments and analyses he says, have been supposed to have proved this, and that this fact

has been urged by less cautious persons as proof of the dominion which chemical research has already given us over the operations of vegetable nature.

But, as he further remarks, this opinion has not borne the test of rigid experimental and chemical criticism. He himself in his earliest writings expressed his doubts of it, and the experiments of Schlossberger and Lawes he regards as justifying the banishment of it from the books.

"*b*. Another opinion in regard to the nitrogen of plants, which has also had much currency, is that plants derive all they contain from the ammonia of the atmosphere, and that they take it up only in the form of ammonia." "This opinion," he observes, "was so contrary to the oldest and most common experience of practical men of all grades of intelligence in the raising of their crops, that nothing but the announcement of it in the form of an undoubted law could have secured any degree of permanent consideration among scientific men. As it was, sanguine young persons, chiefly such as were unfamiliar with practice, took it up and warmly maintained it, both in this country and abroad. A calm consideration of facts, however, is gradually removing this notion from the public mind, and another year or two will banish it from our books."

c. A third opinion is next noticed, as adopted by many and extensively acted upon, that plants obtain all their organic matter directly from the air, and derive, and therefore require, only mineral matter from the soil; or, as Liebig stated it, "the crops on a field diminish or increase in exact proportion to the diminution or increase of the mineral substances conveyed to it in manure." This view, contrary as it was to old experience, obtained general acceptation; and Professor Johnston observes, that field experiments were made and results published, which seemed to confirm it. "But," he adds, "this mineral matter opinion has received its death blow, and we are again on the highway of experience." Among other theoretical opinions which have been more or less satisfactorily disproved, he alludes to these, that the ash of the same plant always contains the same per centage of oxygen in its bases; that gypsum acts only by fixing ammonia from the atmosphere; that common salt enters and remains as such in plants; that analyses of soil lead to no useful practical result; that manures should be prepared in a less soluble form, that the rains may not wash them out of the soil, &c.

As regards the analytical researches, in connexion with agriculture, which the last five years have carried on in the various laboratories of Europe, he observes that numerous gaps have been filled up, old analyses have been repeated and corrected, and valuable data of various kinds have been accumulating, by which our theoretical views are to be amended and widened, and our general husbandry improved. These, though in many respects defective, have prepared the way for more unexceptionable results, and have indicated new lines of research and new fields of inquiry.

In reply to the third question, "*What should now be done to further or make easy the progress of scientific agriculture?*" he makes

these observations.—The first is with reference to field experiments The science of agriculture, he thinks, is now retarded by the want of more sure means of interrogating nature in the field, as well as in the laboratory; and that field experiments must henceforth be entrusted to the more instructed guidance and watchful care of the professional experimenter. The second point which he gives is, to train up and encourage a race of instructed, conscientious and honorable manufacturers of artificial manures; and thirdly, analytical researches should be carried on. On this last topic, he offers the following suggestions, as likely, if adopted, to lead to important results. Thus:

"*a*. The states in which their mineral and organic constituents exist in living plants, is an inquiry of much importance, which has scarcely yet been asked of a single cultivated plant, and to which it will require many years of minute and careful labor to obtain clear and definite replies. In what state of chemical combination, and of mechanical aggregation, do they exist in different parts of the plant? How much in a soluble state in the sap? Of what kind? What purpose does it serve? Is it merely disposing other matter to form fixed parts of the plants, or is it itself on the way to build up such parts? How much of the mineral matter present in the solid insoluble parts is necessary to their existence? How much is foreign unorganized matter? How much actually indicative of disease?

The study of the ash of plants tells us nothing of the nature of the functions of what is burned away—whether it be of an acid or alkaline nature—and yet these are all of much importance. The proportion of mineral acids and alkalies in plants varies; but they contain organic acids and alkalies. Have these mineral and organic substances any relation to each other in quantity? Do they perform the same general functions? Can they take the place of each other in whole or in part? When mineral acids or bases are scarce, can organic acids and bases be produced or taken up in their stead, so as to form a healthy plant? If so, what influence has soil or culture upon this, and how far does this replacement of mineral by organic matter effect the nutritive qualities of the produce?

b. Again, in what states of chemical combination the food enters the roots of plants, is a question, the immediate bearing of which on practice is readily perceived. In what states can the different kinds of food enter, and in what states is it best for the plant they should enter, and what is the influence of circumstances in bringing them into these states? Of all these, he observes, we know, as yet, almost nothing but what rests on bare analogy. The results of direct experiment are almost entirely wanting."

"*c*. Intimately connected with this inquiry," says Professor Johnson, "is the important one, as to the state in which it is most profitable or economical to apply this or that substance to the soil, so as in the greatest degree to benefit this or that crop. How far also ought the physical or mechanical condition and chemical composition of the soil to modify this state? At what period of the year

or of the plant's growth are substances best applied? Are they best laid on all at once, or at successive periods? On none of these points have we as yet any clear scientific information, and here, he states, the conjoined aid of both the field and the laboratory will be necessary, if we are ever to obtain it.

d. But the professor considers still more important the questions which remain unsolved in regard to the nitrogen of plants. "What are the natural sources of all the nitrogen which plants require? How much do they need? What functions does it perform in their interior? How much of what enters remains in them, and how much escapes again into the air from their leaves? These are all questions of an important practical bearing, to the solution of which recent observations, both in the field and in the laboratory, impart a higher degree of importance than we were previously prepared to attach to them."

In his explanation of this point, Professor Johnston says, that Professor Draper's experiments have shown that plants are constantly giving off nitrogen from their leaves in large quantities into the air, and that it appears probable that of the nitrogen which enters their roots, only a small proportion remains at last in the full grown plant, compared with what is thus discharged into the atmosphere. And if these are facts, he adds, *first*, that plants must require a great deal more of this elementary body in their food than has hitherto been supposed, and *secondly*, that its combinations must perform in the plant very different functions and more numerous ones than have previously been ascribed to it.

"*e.* A large field of important investigation is also laid open by another function of the leaf. From the pores of the leaves exude odoriferous and other vapors. These are owing to the escape of volatile vapors from the leaves that we have not yet sought to arrest or examine. The liquids exuding from the leaves are no doubt various in their odors, their differences depending mainly upon the nature and age of the plant." "But," says the professor, "there is reason to believe that they rarely consist of pure water. They hold in solution appreciable quantities of organic and saline matters, which, as the water evaporates from the leaf, remain behind upon its surface or in its pores. These the rain washes off and carries back to the soil; and this is one of the destined functions of the rain in refreshing the growing plant. What are the substances which the plant thus discharges from its leaves? Are they indications of health or of disease? In what form do they enter its roots? Are they necessary to the plant, and ought they, therefore, to be added to the soil? Are they unnecessary and ought they to be carefully withheld? In regard to these points, he adds, old as agriculture is, I believe a single precise experiment has never yet been made."

f. As another illustration, he alludes to the infusorial animals of Ehrenberg, and which abound wherever water and decaying vegetable matter exist together. "These abound in many of the soils. Do they not abound in all? If not in all, in what soils are they most abundant? Do they, like larger insects, prey upon living plants? Have they anything to do with the sickness and death of

clover; with the perishing of young corn; with the fingers and toes in turnips? Are they in any way connected with the benefits derived from draining, from naked fallow, and from the various processes by which peat bogs are reclaimed? Here is a hitherto wholly unthought of field of inquiry, rich in promise, the cultivation of which demands the united labors of the open air experimenter, of the chemist, and of the microscopic zoologist."

He alludes to the very interesting and important relations of light to vegetation, the unexplored fields of research in connexion with the feeding of stock, with dairy husbandry, with the growth of wool, &c., all of which it is desirable to enter on with the united aid of the cultivators of practical and scientific branches of knowledge which are fitted to throw light upon them, and then concludes with the following beautiful observations:

"One cannot help feeling a kind of regret in thus indicating to others trains of research it would be so interesting to follow out one's self. It is like discovering, to strangers, the secret of a hidden treasure we had hoped ourselves to dig up. In this progress of knowledge, and in helping forward, and in some measure directing it, there is so great a charm and honor, that were it possible, with the means and life of one man, I should willingly myself attempt to carry forward all I have suggested; and I should scarcely condescend to point out to you what I would myself, for the sake of science, so cheerfully perform. But the life of one man is too short, his means too limited, and his knowledge too confined to allow of his hoping to see very much progress made by his own hands, under his own immediate direction, or even during his own lifetime. It is something better, therefore, and higher, while we do not cease to labor ourselves, that we should point out the way to others also, enlist the young and the ardent who are springing up around us, awaken the attention and stimulate the labors of experimental philosophers in other countries, as in our own, and urge upon all to bring a helping hand to the removal of obstacles which stand in the way of the progress of all, and which especially retard the advancement of an art on which the sustenance of all so materially depends.

"As one who, meditating on the shores of an unknown sea, discovers islands afar off looming largely on the horizon, which he can never hope himself to visit or explore; or as on some bright day, pictured on the fleecy clouds by the wonderful mirage, unsuspected fleets, or contending armies, or beautiful cities, appear to his admiring eye; which, in bodily presence, he can scarcely hope to look upon, so in his glimpses of scientific fields and subjects inviting, but unexplored, and with kindred feelings, must the votary of progressive knowledge remain content to point out to others what he has himself more faintly described, or seen more brightly pictured in his mind of philosophic truth, leaving to them the after task of unfolding what he has himself been unable to overtake."

The high estimation in which Professor Johnston is held by those who are acquainted with the services he has rendered to agriculture, through his writings and untiring efforts to advance its claims

and improve its character, will be deemed, it is not doubted, a sufficient apology, were one needed, for so full a synopsis of his lecture before the Royal Agricultural Society of England. It may be regarded as a bird's eye view of the progress and present state of agriculture and its relations with chemistry for the last 10 years, and we know not where we could find a better summary of this subject. As such it falls within the scope of this report. There is a fine discriminating spirit exhibited, and the line is drawn with an even hand, between the false and true claims of chemistry, with unusual clearness. The fallacies which have deluded many are plainly exposed, and a better basis is presented on which to erect a more durable structure than the airy fabrics which, like the bubble, have had their moment and exploded and vanished. The objects of future investigation are also pointed out with great precision, and, if his suggestions be followed out, unquestionably rich harvests will be reaped on these fields of inquiry. Even in the very height of Liebig's first popularity, when one might almost have deemed that many had eaten of the root which makes insane—so blindly were his announcements received—Professor Johnston did not hesitate to call in question his views, and has all along presented his own more sober and well supported deductions as a counteractive to the mischief the errors of the former might occasion.

In the statements which in substance or in his own language we have borrowed from Professor Johnston, it is easy to trace the history of the new form in which chemistry has put forth its claims to the regeneration of agriculture. As in every sudden impulsive movement, so it has been with respect to Liebig's influence over the people of Europe and this country. The doctrines broached were set out with such decided authoritativeness that they confounded and awed into submission, while so specious were the arguments by which they were supported, that, if any were disposed to inquire, they might be apt to mistake the glare of his false philosophy for the resplendence of truth. It is ever the case that, in all such revolutions of opinions, much that is crude is broached, and it is not till after the course of years that the true position of affairs can be known; but when the din of the battle is over, and the smoke and the glare are past, there can be discovered what remains and what has sunk beneath the shock. This is the period, and this the point of view, which Professor Johnston has seized upon, and by his own clear optics he enables others to see the results and what is yet to be attempted and gained. His remarks are eminently suggestive, and may be studied in their full extent with great profit by our men of science and intelligent practical agriculturists. The coöperation he recommends of these classes is most important. Progressive improvements will mark the course he points out to be adopted, and the next ten years will witness to more solid advances in agriculture, both as a science and in practice, than the previous ones. The prophecies of the too enthusiastic disciples of the German chemist may not be realized—substitutes discovered by chemistry may not be found so as to dispense with

all the ordinary means of enriching the soil, as has been the dream of some; but the agriculturist may be essentially aided in the management of his soils, his crops, and balancing his system of farm husbandry so as to secure the greatest crops and the highest profits at the least comparative expense of time and labor.

The urgent manner in which Professor Johnston sets forth the necessity of accurate and well conducted investigations to secure reliable facts is worthy the attention of all. In no country is this needed more than in our own. Want of close, patient research and minute examination is characteristic of a people who are so prompt and vigorous in execution. The little steps by which are traced up remote causes to their grand effects are liable to be overlooked in the giant strides with which earnest enterprise presses on to the attainment of its favorite objects. For this reason, with exceptions here and there, we can hardly expect that the mass of even the more intelligent of our agriculturists will have much share in securing the wonderful results he seems to anticipate. From those points where are able, well qualified instructors, who shall train others in the knowledge of their own alchemy, by which the proper tests may be applied, will there go forth thorough observers, whose influence may do much in developing facts, exploding errors and detecting fallacies, and they in turn will operate on others yet, who will swell in numbers and improve in skill and ability for the continued advances that may hereafter be made.

The subject of *vegetable nutrition* which is embraced in the theory of agriculture and its practical bearing is most important. In the last report allusion was made to a work of Professor C. H. Schulze, of Berlin, who, after a close examination, adopted a theory of the nutrition of plants which was there mentioned as quoted from Lengerke. Since then we have obtained Professor Schulze's work, entitled "The discovery of the true theory of the nutrition of plants with a view to an agricultural physiology," and will now give the theory promulgated by him somewhat more fully. In a brief sketch he first adverts to the previous theories, then to the defects and contradictions of the theory of the decomposition of carbonic acid, essentially the one held by Ingenhouz, Senebier, Saussure, and more recently by Liebig. In opposition to this view he alleges various objections, ranged under sixteen particulars. We should be glad if we could adduce them but must now pass them over. But, says he, "If the carbonic acid is not the source of the oxygen given out, then there must be other substances in plants which develope it, and the whole process of the nutrition of plants, the whole theory of manuring must be represented differently from what has been hitherto adopted. These considerations have occupied us for a course of years before we could attain to a method leading from the existing contradictions to the truth. This induced experiments, (the mode of conducting which, and the results, are fully stated,) on the operation of the vegetable acids. The effect of plants on the assimilating substances is also examined, as well as the progress or course of the nutrition of plants, the effect of organization on the substances to be assimilated, the means by

which the digestive operation is produced, the formation of wood sap, the nutrition of the seed germ, the repetition of the germ-formation in young sprouts, parisitic plants, &c. He then takes the position that plants can be nourished without the exhalation of oxygen, and notices the giving out of water by green leaves, after which he comes to the statement of what he considers the true vegetable nutrition. These various subjects are discussed with much ability, and embrace, of course, many most interesting particulars. But we must omit them for the sake of presenting in full his exhibition of the subject, just alluded to, the true vegetable nutrition. This we find thus stated:

"The only basis from which we must take our departure in the explanation of the formation of vegetable substances, is gum, sugar, and the vegetable acids, and probably among these is to be named, as the most common means of vegetable nutrition, the lactic acid, (milk acid,) whether it exists in the tannin liquor, in milk, or by the transformation of the elements of humus, aided by the roots themselves. We have already herein those combinations to which originally belong, besides carbon and oxygen, hydrogen, the mode of the existence, of which in plants has been much more enigmatical in previous theories, than carbon itself. *The absorption of oxygen and giving out of carbon, are the means for the general elaboration of these vegetable substances. These two phenomena, therefore, are to be met with in the entire vegetable kingdom among all plants.* The giving out of oxygen in the light, is a subsidiary means of obtaining by deoxydation of the acids, and acidulated substances, a stronger carbonization and hydrogenization of the vegetable juices; but the basis of the formation of wood and vital sap lie in gum and acids formed and drawn out of the soil by means of the elaboration of the humus, from which the grape sugar and cane sugar is formed in the vessels themselves by greater absorption of oxygen and giving out of carbonic acid. Plants do not merely prepare their carbon by decomposition of carbonic acid, but they rather always give off carbonic acid; for the nutritious substances sucked in from the soil are so rich in carbon, that in order to form these into the vegetable elements, still more carbon must be excreted.

The explanation of the existence of wood sap of the incorrectly so-called crude nutritious juice of the plant, has been probably one of the most difficult points in the physiology of plants. The supposition that the nutritious substances from without must pass over into the plants unchanged, has doubtless been the chief cause why the manifold contradictions respecting the mode of vegetable nutrition have continued unsolved.

An explanation could never be given from the mere carbonic acid as to the elements of wood sap, the formation of gum sugar, of vinous and acetic acid; and in the views respecting the unchanged absorption of humus acid and humus extract, the objection must here strike one, that these substances, as such, are not again found in the wood sap. So far as we know, moreover, there have been made scarcely any experiments to explain the existence of the elements of the

wood sap from the humus, because we are left in uncertainty generally respecting the meaning of wood sap as well as respecting the progress of the vegetative functions in nutrition, from a defectiveness in the knowledge of the minor organs. Through the knowledge of the most remarkable digestive operation of the roots on the nutritious substances in humus, the formation of the gum is explained, as is proved to us in the changes furnished us in sugar by the operation of the roots. The continued absorption of oxygen through the roots and wood proves the ever progressive elaboration of the elements of wood sap by the living plants. As gum and sugar contain a nearly equal proportion of about C^{12}, H^{20}, O^{10}, so the absorption of oxygen and giving out of carbonic acid may have less for its object a combination of oxygen or a decarbonizing, than the transposition of substances for the purpose of forming grape and cane sugar; but, on the contrary, the increase of the acetic, tartaric, lactic, malic, citric acids, always demand for a greater portion of oxygen an oxydation of the gum."

Such is Professor Schulze's statement of the true doctrine of vegetable nutrition, and which he attempts to sustain in the succeeding pages of his work. Here he considers the existence of the vital juice or sap, the salts and acids it contains, the origin of nitrogen in the same, and the meaning of the vital sap in plants.

The last portion of his work, the view to an agricultural physiology, he divides into the culture of the germ, of the growth, of the blossom and fruit bearing, and thus concludes:

"If we now sum up the investigations here made respecting the nutrition of plants, we have the following results:

"1. The opinions hitherto that carbonic acid is the essential food of plants is erroneous, and is not at all founded in nature. This acid is sucked in by the roots only, together with other nutritious substances, and is decomposed with difficulty likewise with them, while the great quantity of oxygen gas which the roots give out has wholly another origin.

"2. There is no sort of proof for the opinion connected with the carbonic acid theory, that water is decomposed and assimilated by plants. This opinion is entirely of hypothetic origin, by which is sought to be explained the existence of the structure of plants containing hydrogen, which could not be explained from the mere decomposition of carbonic acid. We have, indeed, discovered what was before unknown, that plants sometimes exhale hydrogen gas; but this happens only in the dark, exactly at a time when they form no oxygen gas, and has no origin in the decomposition of water. This explosive gas only exists when, to the oxygen gas secreted in the light, is added afterwards hydrogen formed in the dark.

"3. The view which has hitherto been in existence together with the theory of carbonic acid, that plants are nourished by the unchanged humus acid and humus acid salts, is likewise so far incorrect, that plants never suck in unchanged humus acid, humus extract, and humus acid salts. The view that this does happen is likewise merely an unproved conclusion drawn from the operation of humus on the growth generally, but in which it has never been

shown whether or not, also, humus really previously dissolves in carbonic acid, and in this form promotes nutrition, as was the view of Ingenhouz. That humus acid is directly sucked in by plants is also, as yet, an unproved hypothesis, like the theory of carbonic acid; much more, this hypothesis respecting it stands in contradiction with the theory of carbonic acid, that from the absorption of humus we never have been able to explain the origin of the oxygen given out, never could the inward course of activity in the assimilations be analyzed, and in fact the unchanged elements of humus are not the true nutriment of plants.

"4. The true nutriment is rather the humus containing nitrogen *converted into other substances* by the digestive operation of the roots on what surrounds them. These substances are the germ of the wood sap, sugar, and in different plants different vegetable acids, of which the one most commonly met with is the lactic acid. But besides these are also malic, citric, tartaric, acetic acids, and the acid salts of these acids. From the decomposition of these substances is produced the greatest quantity of oxygen which the plants give out in the light. All the formations in plants containing hydrogen, the vegetable tissue, oils, wax, gum, sugar, starch, meal, likewise have their origin from these substances.

"5. Plants form sulphur and phosphorus immediately by the decomposition of the phosphate and sulphate of lime sucked in from the the soil by means of the oxalic acid, the main object of which, in the economy of vegetable life, seems to be especially this decomposition. From the liberated sulphuric acid and phosphoric acid, the oxygen is then secreted in the light, while sulphur and phosphorus itself is assimilated and employed for the formation of the substances containing albumen, gluten, and the oils which contain sulphur."

It is evident from the above summary, that Professor Schulze's theory of vegetable nutrition differs from any of the former ones, and, though probably approaching nearer to the humus theory than its opposite, holds a sort of middle place. It is here given as part of the progress of the science of agriculture in its comprehensive sense.

Some experiments in vegetable physiology on the growth of certain plants by night or day, furnished to the Oekonomische Neuigkeiten by F. W. Janig, present interesting facts on the science. His experiments were made with briony, pharcala, cider, and flax, and resulted in the following conclusions:

"The growth of these plants advanced uninterruptedly by day and night; but, with the exception of the flax, the growth was more by day than by night. Further, the observations made on the briony the first day showed that, with the increase of the heat of the sun, the growth of the outward portions of the plants fell off, and also in disturbed and rainy weather. The former may probably be explained by the great evaporation of the leaves, by which the absorbent vessels could only imperfectly execute their functions, while in moist, disturbed weather, at least with most plants, a cessation of evaporation takes place, and likewise the regular assimilation of carbonic acid is disturbed.

"Flax grows, on an average, more in the night than in the day, and more in troubled weather than in sunshine—a proof that it requires for its success a moist atmosphere, and hence, also, succeeds so admirably in mountainous countries and on sea coasts. But it appears that, for a *rapid* success, a definite concentration of vapor, and, probably, also a certain degree of warmth—for I neglected to observe this—are absolutely necessary; for, in the whole summer of 1846, I found the increase by day and night of $3'''$ to $1''$, and only on a single night had the flax increased about $3''\ 2'''$; this particular night, therefore, it must have been acted on by particular agents. On leaved wood, the chief forester, Stephen Weinar, likewise day and night observed a continued growth, and found an average increase by night one-third less than by day."

The phenomena of vegetation is now occupying the attention of scientific men, both in this country and in Europe, to a greater extent than it has ever before done. Many inaccuracies in former views, resulting from the want of care in conducting experiments, have been corrected; while it is believed the great general principles remain, for the most part, unshaken, the experience of thousands of years are more and more strengthened in the details.

Among the interesting facts relating to the growth of plants, we find some in the following extracts from the Memoire of Mr. Quetelet on the climate of Belgium, &c.: (See Bixio's Journal d'Agriculture Pratique et de Jardinage.)

"1. A considerable number of causes operate to produce a variation of the periodical phenomena of vegetation. The most active of all these, in our climate, is the temperature.

"2. It is estimated that the progress of vegetation is in proportion to the sum of the temperatures, or rather to the sum of the squares of the temperatures reckoned above the point of congelation, taken from the instant when the plants awake from the wintry sleep.

"3. The colds of winter, if they do not alter the constitution of the plant, and especially if the earth has been covered with snow, do not cause very sensible retardation in the ulterior development of plants. But it is necessary to have respect to the effects which they can produce, and especially to the state where the plant is found, when it begins its winter sleep—a state which corresponds to a certain sum of the temperatures acquired. When we refer to the maturity of the harvests, and in general of plants which increase under the influence of the sun, we must consult the thermometer which is exposed to the same influence itself of that orb, and not the thermometer placed in the shade, as is commonly done.

"4. The temperatures of the night are not to be compared to those of the day as to their effect on vegetation. We must, also, necessarily have regard to the quantity of light which plants receive.

"5. A more northern latitude of one degree produces nearly the same retardation that a height of 100 metres does, that is to say, a re-

tardation which, in our climate, is equal to about four days. This result can be regarded only as a species of average of amounts of variations during the course of the whole year. The difference of latitude and elevation have scarcely any action except to cause differences of temperature.

"6. The variations of temperature, other things being equal, are favorable to vegetation; and the same is the case of elevated plateaus where the radiation can in a greater or less degree be more active.

"7. The *isanthesique* lines or of simultaneous flowering do not preserve any parallelism at different points of the year; thus the line which, over the globe, witnesses the flowering of the jasmine the same day, and that which passes ten days after by another series of places, tend to accomplish the same phenomena. Now, the zone comprised between these two lines is not of the same breadth in all its extent as a zone comprised between two parallels would be. It is not even constant, that is to say, a month after, for example, the isanthesique lines will all have different forms; and places which have been retarded, in reference to others, may then be in advance. For example, the first symptoms of the waking of vegetation after winter, show themselves from twenty to thirty days earlier on the western and southern side of England than in Belgium, and nearly at the same time as in the north of Italy and south of France; but at the moment of flowering, that advance is lost, and the maturity of the fruits of those three countries are in advance of the first. The efflorescence and flowering take place in Belgium twenty days earlier than in Berlin, as well as in all the north of Germany, or the south of Sweden, thirty days earlier than in the State of New York, and two months earlier than in Lapland. The efflorescence in Belgium takes place nearly at the same moment as in Parma, but the ripening of fruits does not occur till fifty days after it has occurred in those last places.

"8. In fine, the fall of the leaves is a phenomenon which in our clima e depends as much on the present actual temperatures a of those which have preceded. It is brought on generally by the first frosts f autumn."

Besides these, it is said: "At the same time that these researches have been made in Belgium, a modest savant in Germany has made others very analogous, which, in our view, throw an entirely new light on the relations which belong to the principal phenomena of vegetation to the different atmospherical conditions to which the plants are subjected. The observations of Doctor Fritsch seem to us too interesting not to be published, but we shall content ourselves with here citing the principal results. We borrow them from the *Algemeine Deutsche Natur-historische Zeitung:*

"In the horizontal localities, says Dr. Fritsch, the number of plants which flourish at the same time is more considerable than in those lands of the same nature which incline towards any point of the horizon.

"In a good exposure to the sun, and with the same nature of

soil, the number of plants flowering is three times more than in places poorly exposed or shaded.

"The number of plants blossoming at the same period varies according to the exposure. This number diminishes from the point of exposure of the southeast, which is more favored in our climate, in the degree in which it turns more to the east and north, until it reaches the northeast, which is the point most unfavorable to flowering; but passing that point in the degree that the exposure returns to the southeast, and passes by the west and south, the number of flowering plants insensibly increases."

The coloring of flowers is intimately connected with the alternations of the seasons, and the examination of these different phenomena is a part not less interesting in the memoir of our observer.

"In taking," says he, "in mass the ensemble of the vegetables of our country, or in considering separately the groups of vegetables, the flowers of which present one and the same coloring, we see invariably the number of flowers increases from December to July. White flowers (always in central Europe) are the most numerous, in the whole period of the year when plants are seen to blossom; after these come the yellow, then the orange, the blue, the violet, the green, the orange,(?) and lastly indigo flowers, which are at the same time the last to show themselves and the most rare. The law, according to which the increase of flowering takes place, shows itself to be closely connected with the mean temperature."

"In the meantime, although in a general manner we cannot mistake the influence of the temperature on the flowering, and we see the latter increase or diminish in proportion as the temperature itself rises or falls, we cannot deny that from time to time are exhibited other anomalies which the change of temperature alone cannot explain; such, for example, is the rapid decrease of the number of flowering plants from the point of the last days of July to the end of the following month.

From the month of January, or more precisely perhaps from the winter solstice, the period when all the flowers are white, even to the vernal equinox, the relative number of white flowers rapidly decreases; after that period the proportion of the same flowers gradually increases until the middle of May—then diminishes anew, insensibly, even to when the frosts of winter arrest all kinds of vegetation.

If we set aside (considering them as an anomaly for the season) the very small number of yellow flowers which appear in February and in March, we see that the proportion of flowers presenting that color increases continually from the first days of April to the end of June. From that period to the middle of the month of August it remains stationary; then it increases anew, and with a certain rapidity, until the arrival of frosts.

The proportional number of red flowers gradually diminishes from February to the end of April, then it recovers the ascending scale till the end of August, then decreases till the month of October; it then recommences rising to that point, that in the

month of November, there exist, perhaps, no flowers but of this color.*

The green or greenish flowers diminish in number, from the month of March to the end of May; from the point of the latter period, their proportion is pretty nearly uniformly maintained till winter.

The proportion of the blue flowers, on the contrary, increases to the middle of April, afterwards decreases till the summer solstice, then ascending anew, it returns to that which it had in the month of April, after which it sinks rapidly, and totally ceases on the arrival of the frosts.

As for other colors, (the violet, the indigo, and the orange,) their appearance is not made regularly enough to permit the author of these observations to fix upon the law to which they are subjected. In order to present at a single glance of the eye, as in a synoptical table, the proportion of the flowers of each color to the different periods of the year, he has followed his memoire with a chart, in which the colors are represented by curves, which rise or descend according as the relative number of flowers which they designate increases or diminishes. A remarkable fact, and one almost without exception, is, that each one of those lines rise at two points, and descend at two others; these are what the author calls the positive and negative poles. In the three columns, which in the table represent the months of spring, the lines approach each other much in a horizontal direction, in such a way, that the poles or maxima of elevation or depression all fall in spring and autumn. What is especially worthy of attention is the opposition (it cannot be more clearly expressed) towards the poles of the white and yellow lines; wherever the one rises, the other falls in the same proportion. The line of red flowers proceeds even to the month of June, almost parallel to that of the yellow flowers; when it has reached there, it diverges and continues to remove itself until the end of August, when it returns to cut the first, taking a direction opposite to that which it had hitherto followed; but what is curious, is that this red line, in all its course, remains constantly parallel to that of the green flowers. The curves indicating the blue and violet flowers proceed equally; those of the blue flowers and yellow flowers, on the contrary, constantly proceed inverse to each other, wherever they undergo deviations; the one descends always as the other rises, and vice versa.

We might constitute, generally, the following law for the coloring of the entire German flora. In the spring and summer, the prevailing flowers are, first, the white, then the yellow, and finally the red; in autumn, on the contrary, they range, first, the yellow, then the white, and lastly the red. It is well understood, this law applies to species, not to individuals.

It may yet happen that a group of plants having flowers of the

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* It is well understood that here the author of the memoir speaks only of cultivated plants, not of wild plants, which by some accident are found to blossom out of their normal seasons; besides, there is no rule without an exception.

same coloring, and rich in species, blossoming all of them nearly at the same time, present on the synoptical table less development than a similar group of a different color, comparatively poor in in species, but, in which, the flowering of each is effected at long intervals.

The corolla of plants do not fade at the same hour of the day. M. Fritsch has also submitted observations with respect to this kind of phenomena.

According to him, the number of plants which open their corolla during the night is very few, compared to that of plants which blossom during the day; he estimates it somewhat more than 12 per cent. of the entire amount of vegetables in Germany.

With flowers which open in the morning, the duration of the evening (by which the author means the space of time during which the corolla fades) is short; for example, it is four hours for the *prenanthes meaulis*; six hours for prenanthes *vinisaca;* five hours for lettuce; ten for the field marigold.

There is also a certain proportion, but feebly expressed, between the coloring of flowers and the moment when they fade; M. Fritsch, thus estimates them, taking 100 for the term of comparison:

	Flowers opening in the morning.	Flowers opening in the evening.
Yellow	50	50
Red	18	5
Blue	18	19
White	44	20
	100	100

We might refer to some other results of M. Fritsch's observations, but are obliged to restrain ourselves; we have been limited to simply citing the most striking passage of his memoire, to exhibit how much similar researches, were they multiplied, would throw light on vegetable physiology, in the meantime awaiting till means are found to make successful applications to practice."

In our former reports we have alluded to the subject of the economy of farming. It would surprise the agriculturists of our country to see the extent to which such investigations are conducted in Germany. Volumes are written embracing the nicest calculations, and an acquaintance with the principles on which the tables are constructed is a part of a thorough agricultural education in that country.

Among the exhibitions of science as applied to agriculture is the *statics* of agriculture. This is a branch of agriculture which is entirely unknown among us, and although there is not probably the same reason for its introduction as in those countries, some advantage might be obtained by the attention being turned to the principles on which it is established. By the statics of agriculture or land husbandry, is meant the reduction of the various valuations of soils, crops, and other things by which estimates of this kind

may be formed to mathematical precision, a sort of algebraic notation by which calculations are made in reference to the particulars of agriculture. The productiveness of land is expressed, for instance, by some particular letter, p., and so on with other things. The soils being all classified, tables are formed based on the character of the soil, the product, the price, and weight of grain or other crop, so that the valuation of the land is reached. This forms the groundwork on which taxation is laid, and men of the highest talents have entrusted to them the formation of these tables. The consequence is, that proceeding on these elements there must be an uniformity in the fixing of values and taxation resulting therefrom, very different from the ten thousand varying estimates of assessors and boards of taxation in our States. Something of these principles might be applied by our State governments to equalize taxation over the State. The persons to whom are entrusted the construction of such tables, are, of course, those who are versed in the various branches of knowledge which have to be applied.

In the writings of authors on these topics, there is gathered a vast amount of practical information, for to prepare such tables regard must be paid to all the elements which may influence the valuation of the different things specified. It cannot be imagined by any one, that agriculture can be reduced to all the precision of mathematical science, but a great number of problems may be solved by the use of a notation which will shorten the processes of obtaining the results in a supposed case. The definite object of statics may be considered to be to furnish the equation between the exhaustion of the soil by the agricultural products raised in it, and to ascertain and establish the supply by the addition of new materials of vegetable nutrition. The prominent writers on the subject are *Wulfen*, *Von Thunen*, and *Hlubek*. Wulfen led the way by his publication, "Method of estimating the Wheat System." His work is a small volume in which the system is developed. Hlubek's is much larger and more perfect. Experiments were tried to test the new science, and the coincidence of some of the results was quite remarkable. We quote such a comparison in one case, of eleven years averages, giving the actual products, and those ascertained by the rules of statics.

No. of Shift.	Crop.	Yielded actually, cwts. at 100 lbs.	Should yield according to stat's. cwts. at 100 lbs.
I	clear fallow	——	——
II	turnip	5.47	5.47
III	winter crops	10.83	10.67
IV	summer crops	7.85	7.70
V	potatoes	79.21	79.21
VI	large barley	10.14	10.16
VII	mowed clover	23.40	23.40
VIII	pasture clover & fallow	15.60	15.60
IX	winter crops	11.44	11.48
X	pod fruit	7.36	7.16
XI	summer fruit	9.18	9.12

The agreement of the products is most striking, as there is only the difference of 0.16 cent. on 11 years averages. A discussion was carried on at the general meeting of agriculturists at Stettin, between Von Schlicht and Dr. Sprengel, the former defending statics against the objections of the latter, but so far as the account is given, the question was left undecided. It is hardly probable, that statics can be of universal application, though they may answer for some particular crops on the same piece of land, and in average seasons. The formula of Wulfen employed by Von Schlicht as the basis of his opinions on the subject is $t \times r = c$. By t is meant the activity, by r the richness, and c the crop—in other words, the two factors, the activity and richness of the soil being multiplied, give the product. Everything, therefore, must depend on the manner in which the two factors are reckoned, and to reach this, all the various elements operating on the crop are brought into view. The system does not admit of explanation in its details in our limits. It was only intended to allude to it as evincing the investigations which have been undertaken, and the minuteness into which they enter on topics of agricultural science in Germany.

Greater precision is desirable in the account of experiments undertaken in order to enable us more accurately to draw our conclusions. The importance of this is not sufficiently appreciated, and yet it is important enough to modify conclusions which are adopted as the basis of theories, sometimes involving the discarding of established principles of practice, and the adoption of others entirely new and untried. Much inconsistency and many needless disputes might no doubt be avoided, which result from causes like these, and the progress both of science and practice be very considerably aided by attention to this particular here advocated.

We may illustrate our position by a brief reference to some well known examples or subjects. For instance, in the account given of the effects of different manures, in all trial experiments it is important not merely that the article mentioned be used, but that it be of the best quality of its kind, or if not so, that its variation from such standard be fully noted, and taken into the account in estimating the effect.

Substances passing under the same name, and those sold in the shops, are often most diverse from each other by adulteration or from other causes, so much so, indeed, that they can hardly be regarded as sufficiently similar to be compared or to allow of the transfer of results found to be secured from the one to the other. Suppose that mention is made of sulphate of soda, nitrate of potash, phosphate of lime, or any other inorganic substance applied as a manure, it ought to be tested, and it should not only be known that it bears the name, but is in truth the *very article* it professes to be. Then again, where this has been ascertained, and its strength and qualities duly noted, the *mode* of its application, whether in mass or in a dry state, or in solution, is likewise important. Its effect may be much modified by this method, far beyond what at first view might be conjectured. The *state* of the soil,

likewise, when applied, whether *dry* or *moist*, *recently* or *more distantly prepared*, the *time of the day*, and whether in any of the cases there existed *any interval* of time, and if amounting to a considerable portion of the day, at *what hours* of the day it was done in any case, may each receive notice. Some substances may be more efficacious at one point of time than another; just as it is known that such is the case with many remedial agents in their influence on the human organization as compared with each other. We would not advocate the precise following out of a previous mode without the slightest deviation, as in the case of the Indian who, because one man was cured by drinking at a particular fountain in a particular way, supposed it necessary for him also to approach it on a certain side, kneel down in a particular manner, take up the water exactly as the other did, &c., or no cure would be effected. Greater precision, however, is of more importance than is supposed.

In some of the appendixes will be found various tables of statistics, exhibiting the results of our agricultural products on the commercial intercourse and general national wealth of our country. It is not deemed necessary to specify particulars, as the tables will speak for themselves, and in consequence of delay in obtaining some of the information, the portions of articles relating to various crops may find a place there instead of separate appendixes, which would have been otherwise appropriated to them; several very interesting communications may be included in the appendixes now referred to. Among these may be mentioned, one on the ice trade, derived fom a person who is extensively engaged in the preparation of this article for market; and which will be found to contain many facts that will be new to most of the readers of the report.

A valuable table, of the prices of various agricultural products in the principal cities of the Union, will also be placed among these statistics. Unfortunately, we were not able to procure those for New Orleans for insertion in the same, as was intended.

But in respect to many of the tables which will be found in the appendixes, and which have been prepared with great labor, it is believed there are some which will be acknowledged to be valuable, as well as wholly new. They exhibit only the beginning of what can be done, if the same course is pursued with more extended means, and show the vast extent of resources which a full survey of our various wealth as a nation would present.

The progress which agriculture has made within the last ten years is great, and an equal or greater advance in the ten that are to come may be reasonably anticipated. Our last report so amply alluded to the grounds on which this expectation may be indulged, that it is not necessary to say more at present on this subject.

A single point or two may be touched upon as illustrative of our views.

The vast extent of our country, its great diversity of soil and climate, open to us the position of domesticating almost every species of plant that is useful for food or for application to the arts,

Increasing facilities of intercourse with foreign climes which have been comparatively shut out from us; the spirit of enterprise which will prompt to the trial of acclimating new products: (of this, at the present time, the experiment with respect to the tea plant is a decisive instance;) the influx of emigration from Central Europe may be expected to increase, and with these, in some degree, will be introduced much practical knowledge of husbandry as conducted abroad. This must be modified in its adaptation to this country, and yet it will unquestionably exercise its influence. Then no truth is more clear, that when once the way is opened to improvement, the beginning really made, the advance is rapid. Such is the case in our country as regards agricultural science. The beginning has been made; the door is open; many eager aspirants are pressing on to share in the rewards that a diligent attendance on these lessons will impart. The bare fact that our territory has been so extended, no doubt, is adapted to produce unusual enterprize. The spirit of the people is an almost restless activity. Under this influence they are pouring forth to California, where the thirst for gold now impels them. For a time, this may divert the labors of the husbandman. But the great spectacle of the world's progress has just begun. Revolutions are but the work of a moment now, and mind, active mind, is at work forging out its instruments, which, like the fabled thunderbolts of Jupiter, wrought by Vulcan, will yet fall with crushing force on whatever opposes the law of progress by which the world is to be renovated. Agriculture is a more peaceful and silent cause in its operation, but the wrecks and ruins of the former world, covered with mould, under her skilful hand will be clothed with verdure, golden harvests, and plenty for man and beast.

God has given us all the elements in soil, climate, productions, and means of improvement, and we need only but be true to ourselves, and our advance in every peaceful and happy portion of national progress cannot but be rapid and glorious. Nations may feed from our stores, follow our example, and bless us as their truest benefactors. While the farmer holds the plough, the earth yields her increase, and knowledge is becoming more and more the birthright of all; every sister art will flourish, and life be increasingly crowned with knowledge and comfort.

APPENDIX NO. 1.

Report on the Breadstuffs of the United States—their relative value, and the injury which they sustain by transport, warehousing, &c.—By Lewis C. Beck, M. D.

Rutgers' College,
New Brunswick, N. J., December 15, 1848.

Sir: I beg leave to submit, in as concise a manner as possible, the results of my researches in regard to the breadstuffs of the United States since April last. The work has been prosecuted in accordance with the instructions which I have received from you; and I hope its execution, thus far, will commend itself to your favor and to that of the public. Being impressed with its importance, I have spared no pains to prepare myself for the faithful discharge of the trust with which you have been pleased to honor me.

I deem it proper to state distinctly that my constant aim has been to render this investigation useful. My object has been to show in the simplest manner, and with as few technicalities as possible, how the value of the various breadstuffs may be determined, their injury guarded against, and their adulterations detected. Whilst I am by no means insensible to the importance of accuracy, and yield a willing homage to those who are engaged in minute and careful ultimate analyses, I supposed that the purpose which you had in view would be best accomplished by the employment of such processes as may be easily understood and even repeated by all those who feel sufficient interest in the subject to read the description which I shall give of them. I concur entirely in the remarks made by a reviewer of the first report on coals suited to the (British) steam navy, "that the neglect of government to aid science is due, in a great measure, to the mistaken views of scientific men. They have too often overlooked or disregarded those matters which have a practical tendency, which politicians alone consider of importance." "Men engaged in maintaining the balance of power and regulating the complicated machinery of a great commercial and manufacturing commonwealth, however capacious their minds, cannot be expected to entertain the theoretical views of the philosopher, who sacrifices his knowledge of the world to his love of science."

I thought it proper thus to announce the plan which has been adopted in these researches, to render them useful to the *many*, without attempting to make additions to the already accumulated stores of the *few*. As the people, through their representatives, have furnished the means for carrying on this work, they are entitled to receive all the benefits which are to be derived from it.

I have only to add that my attention, thus far, has been almost exclusively directed to wheat and wheat flour. I propose during the next year, should the work be continued, to extend the examination to such samples of these as may hereafter be received, and then to proceed to that of maize and maize meal, which have recently become such important articles of export.

I have the honor to be your obedient servant,

LEWIS. C. BECK.

To the honorable Edmund Burke,
Commissioner of Patents.

REPORT.

Agriculture, commerce, and the arts, constitute the chief business of the industrious portions of our race, and it is to the physical peculiarities of a country that we are chiefly to refer the predominance of one or other of these pursuits. Thus England, with her vast mineral wealth, and her dense population, must almost of necessity be a manufacturing nation; and, although she is also noted for her extended commerce, and her improved agriculture, the great attention which she has paid to the latter, may, perhaps, be fairly ascribed to those peculiar views concerning the interchange between nations which have heretofore prevailed. The rich and valuable mines of the central portions of the continent of Europe, and the numerous arts which can flourish only in their immediate vicinity, must ever give occupation to a large portion of their inhabitants. Comparatively few commercial advantages are enjoyed by them, and the produce of their agriculture seldom rises above the amount which is necessary for the supply of their own immediate wants. In all these countries, therefore, the failure of a single crop is the cause of serious apprehension, and in some of them, as in Austria, although a large proportion of the population is engaged in agriculture, there is need of a yearly importation of breadstuffs. This has been ascribed to a defective mode of tillage, but I am inclined to believe that it arises in part at least, if not entirely, from the high price of the land. It is the large returns which the farmer must extort from the soil in order to meet the interest of the heavy investment which discourages him in his efforts, and which at length has the effect of diminishing the amount of the agricultural products. All the appliances of science and art may be called into requisition to increase the yield of the soil, but every improvement of this kind only serves to increase the price of the land and the amount of rent which must be raised from it. When we look at the contrast which the United States present in this respect, we need not wonder, that while travellers speak in raptures of the agriculture of France and Belgium, Germany and England, the famished population of some of these countries has been fed by the surplus produce of a comparatively rude mode of tillage.

During the year 1847, breadstuffs to the value of $43,000,000,

were exported from this country to Great Britain and Ireland alone. The vast agricultural resources of the United States were then for the first time duly appreciated. Notwithstanding the quantity exported during the present year bears no proportion to that of the preceeding one, there can be little doubt that our country is destined to be the *granary of the world*. We cannot boast of those mineral riches which are found elsewhere; still deposites of iron ore and coal, those most valuable products, exist here in great abundance. But our chief treasure is the soil, and the immense extent of our republic, and the liberal policy which has been pursued in regard to the disposition of its lands, places it in the power of almost every inhabitant to become the owner of a domain, which in Europe could be possessed only by the favored few.

It is a common mistake that land which is in the highest state of cultivation, and yields the largest crops, is necessarily the most valuable. It is stated by Boussingault, that a field in the neighborhood of Pampeluna, where the rent of land is extremely low, gave a profitable crop of wheat, although the yield was not more than from six and a half to seven and a half bushels per acre. "An English farmer," says Washington in a letter addressed to Arthur Young, "must have a very indifferent opinion of our soil when he hears that with us an acre produces no more than eight or ten bushels of wheat, but he must not forget that in all countries where land is cheap and labor is dear, the people prefer cultivating much to cultivating well."

It is this very extent of our country, and the cheapness of the land, which now, as at the date of the letter of Washington, contribute to render our comparatively rude culture the most profitable in the world. Thus, while the average of the produce of wheat in the United States is not probably above 15 or 16 bushels to the acre, that in Germany is more than 25 bushels; in England, 25 or 26; and in France, 24. Still, as has been already stated, the amount of breadstuffs raised here, far exceeds that produced in either of the countries above named. And the same consideration, viz: cheapness of land, together with the rapid and cheap rate at which, by machinery, the crop harvested and made ready for the miller, must give to the western States and Territories great advantages for the cultivation of the cereal grain.*

As there is no probability that, for many years to come, our population will be over-crowded, and the price of good cultivable land be much increased, it is easy to see what must become the leading occupation of the multitude who will here seek refuge from the poverty and oppression of other countries. The truth of this

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* Mr. O'Reilly stated at one of the meetings of the New York State Agricultural Society, during the winter of 1844, that the product of the wheat lands, between Seneca lake and the Niagara river, had not, for the preceding three or four years, exceeded the low average of eleven or twelve bushels per acre. The land in western New York generally bears a high price, and the problem to be solved is, whether by a more efficient system of agriculture the average yield can be so much increased as to afford a return for the investment. What will be the result may be inferred from the well known fact that a large proportion of the wheat flour, with the "Genesee and Oswego" brands, is obtained from wheat grown in the far western States.

proposition will probably be quite apparent to those whose attention has been directed to the subject. But a large number of our citizens have no just idea of the agricultural resources of the United States. One object of this report, therefore, is to spread out the facts, and to give them the widest publicity; to show, indeed, that while commerce and the arts must give employment to a great number of persons, our great business is agriculture; and that the true interests of the country will be promoted by giving to this pursuit all necessary encouragement.

I have said that our mode of culture is still comparatively rude. It was quaintly remarked to a traveller by the gardener of Drummond castle, that "if science once gets into the farmer's ground it penetrates into the very heart of a nation." This is perhaps true;* but it must be confessed that, thus far, the influence of science upon agriculture has been very trifling when compared with the vast improvements which it has effected in the arts. The difference proceeds principally from two causes assigned by Count Chaptal: "The first is, that the greater part of the phenomena offered to us by agriculture, are the effects of the laws of vitality, which govern the functions of plants, and these laws are still in a great measure unknown to us; whilst in the arts which are exercised upon rude and inorganic matter, all is regulated, all is produced, by the action either of physical laws only, or of simple affinity, which are known to us. The second cause is, that in order to apply the physical sciences to agriculture, it is necessary to study their operations profoundly, not only in the closet, but in the field." It will not, therefore, appear surprising that the researches which have been made in regard to plants have often assumed a wrong direction, and have not led to those important results which were promised upon the one side and expected upon the other. Thus most of the analyses of the proximate principles of plants, not having been made upon such as are in a perfectly pure state, are to be considered only as approximations of the truth. The same remark will, in a great measure, apply to the numerous determinations of the quality and quantity of the ash obtained by the combustion of the grains used as breadstuffs. "The grain is an assemblage of various distinct parts, differing from one another in composition, and varying also very much in their relative proportions. So also the dried stem of a plant, the entire straw of a cereal grass, may be burned in like manner. But this, too, is an assemblage of many parts. The exterior less vascular portion, the interior full of vessels, the fluids which circulate

*I say "perhaps," because in agriculture, as in all well conducted enterprises, every thing depends upon a comparison of an estimate of the expenses with an estimate of the profits which accrue from them. Paradoxical as it may seem, it is nevertheless true, as stated by Chaptal, that a farmer may be ruined by a good harvest. When science, therefore, suggests a lavish expenditure simply for the sake of insuring a large yield per acre, she does a positive injury. The end of those who follow at random all the innovations proposed, is invariably disastrous.

through them, all contain their peculiar inorganic substances, and all vary almost endlessly in their relative proportions."*

Similar objections might be urged against the analyses of soils which have been so vigorously prosecuted by many chemists. That the facts which have thus accumulated may have some value, is not to be doubted; but they must after all be considered as only introductory to researches conducted with a more just appreciation of their true influence upon the improvement of agriculture. It is to be feared that in many cases these almost useless labors have been suggested by the crude and hasty generalizations, which, unfortunately within a few years past, have too often usurped the place of patient inquiry. A recent writer has well observed, that "of the classes which have been thus led away there has been none which has been so far misguided as the sober one of farmer. It is to him that the vegetable quack appeals, offering, in the application of chemical manures, electricity, magnetism, and other agents, harvests more golden than the world had ever seen before."

I trust it will not be inferred from any of the remarks which I have made, that I undervalue the importance of physical science in the improvement of agriculture. On the contrary, I doubt not that with a right appreciation of its objects and a true direction of its labors, it is destined to contribute greatly to increasing the productiveness of the soil. But such results cannot be immediately realized. "Years of experiment must pass by, numerous failures must be experienced, before the real advantages of scientific farming will be evident." It is sincerely to be hoped that the false expectations which have been from time to time held out by visionary men, may not have the effect of exciting in the minds of agriculturists a prejudice against all the improvements which may hereafter be proposed.

The chief breadstuffs of the United States are wheat, rye, maize, and buckwheat. Of these, the first is by far the most important, and it is to its history, culture, and chemical examination, that particular attention is now to be directed.

Wheat.—Wheat is the principal breadstuff of the United States and of most European nations. This, as well as the other cereal grasses, has probably come to us from the east; but it has been so much changed and improved by culture, that its connexion cannot be satisfactorily traced to any species of the genus now known to be growing wild. Of all the cereals, it is that which requires most heat, and its culture first begins to be of importance below

* The above remarks are from Prof. J. F. W. Johnston's advertisement to the English translation of Mulder's chemistry, part iii. Prof. Johnston has himself been largely engaged in the kind of researches which he now characterizes as indeed possessing some agricultural value, but which must be entirely dismissed by the exact physiologist. To set this matter in a still stronger light, he adds the following: "An amusing English chemist lately dried and burned an entire mouse, and, from the results of his combustion, drew grave results in regard to points which lie at the very confines of our existing knowledge. He might as well have put a whole man in his crucible or his combustion tube, and reasoned upon the nature of the ash, or the proportions of the gases he had collected."

60° north latitude in Europe, and considerably below that line on our continent. From the meteorological observations which have been made, we infer that a mean heat of at least 39° Fahrenheit is necessary for the growth of wheat, and that during three or four months. The mean summer heat must rise above 55° Fahrenheit. It does not, however, bear tropical heat well; in countries within the tropics it first occurs at altitudes which in climate correspond with the sub-tropical and temperate zones.*

There is a fact stated by the author just quoted which exhibits in a striking manner the advantages our country must possess for raising and transporting the produce of this important cereal. It is, that although wheat is very productive and of excellent quality in Chili and the republic of Rio de la Plata, and immense quantities are sent to Peru and even around Cape Horn to Rio Janeiro, yet North American flour is sold at the market of Valparaiso, and the bakers are obliged to buy it, as it is cheaper than the flour made in the country, because there are no roads in the interior, and wages are exceedingly high from want of sufficient hands.

There are few parts of the United States in which wheat may not be raised. But the productiveness of the crop is influenced by various circumstances, as soil, climate, and expense of transport to the great commercial depots. These, and the more profitable cultivation of other articles, as tobacco, rice, cotton, and the sugar cane, have nearly fixed the southern limit of the wheat growing region of the United States in North Carolina.† The particular districts, however, in which the culture of this cereal is most successfully prosecuted, are the western parts of New York and Pennsylvania, Ohio and the northwestern States and Territories. The rich and virgin soil of the western prairies seems to be peculiarly adapted to the growth of wheat; and the great lines of communication which are already established between these and the Atlantic cities afford every facility for the transport of the surplus produce.

It has been already remarked that the profits of the culture of this cereal do not depend upon the yield per acre, but upon the cheapness of the land, and the economy practised in its management. The want of precise information upon these cardinal points renders the statements which have been made in regard to the productiveness of wheat in various parts of the world of little practical value. Thus when we are told by Meyen that in Prussia the average produce of wheat is not more than five or six fold of the seed; that in Hungary and Croatia it is from eight to ten fold; and that in some parts of Mexico the produce in favorable years is from twenty-four to thirty-five fold, the information is of no use to the farmer, because the relative expenses of the culture and the value of the crop are not stated.

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* Meyen's Outlines of the Geography of Plants.

† Mr. J. B. O'Neall, in an address before the Agricultural Society of South Carolina, estimates the value of the flour imported into that State at $260,000, of corn $150,000, of oats, peas, and hay, $585,000.

Notwithstanding what has been said concerning the profitable culture of wheat in large portions of the United States, and the probability that the great west will hereafter furnish the principal supply for export, we should by no means overlook those causes which exert an influence upon the productiveness and quality of this grain. It has been ascertained without doubt that the real value of wheat and of the other cereals and breadstuffs, depends mainly upon the proportion of gluten and albumen which they contain, their starch, glucose and dextrine, or gum, not being considered nutritive. It appears also that wheat exceeds all the other cereals in the quantity of nutritive matter which it yields. Another advantage which it possesses is, that it furnishes also a greater quantity of flour; for fourteen pounds of wheat yield thirteen pounds of flour, while fourteen pounds of oats yield only eight pounds, and an equal quantity of barley but twelve pounds.*

That wheat is peculiarly sensible to the effects of soil and climate appears to be a well established fact. It is stated that even in different parts of England the crops and their produce are very various. The Sicilian and southern wheat generally contains a larger proportion of gluten than that from more northern countries. This, no doubt, arises from its more rapid growth, its harder and tougher grain, and its less proportion of moisture. Hence, also, it keeps better, and commands a higher price in market, especially when required for exportation. I have reason to believe, however, that the superiority of southern wheat has usually been over-estimated, and that the proof almost always adduced of its containing more gluten than that from the north, viz: its employment in the manufacture of macaroni and vermicelli, is by no means conclusive.†

One of the most important points connected with the subject of wheat and wheat flour, is the proportion of water or moisture which they contain. We have the high authority of Boussingault for the statement that, in France, "it is undoubtedly in consequence of the large quantity of water which the northern wheats contain, that we meet with such indifferent success when we attempt to keep them for any length of time in our granaries. The wheat of Alsace, for example, frequently contains 16 to 20 per cent. of moisture, and I have ascertained by various experiments that it is almost impossible to keep it without change in vessels hermetically sealed. To secure its keeping, the proportion of water must be re-

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* Burnett's Outlines of Botany.

† According to the analysis of Professor Johnston, the fine flour of the celebrated Amalfi, or macaroni wheat, brought from Italy by Colonel Hamilton, contains, in 100 parts, 13.30 of water and 11.62 of protein compounds, (chiefly gluten.) This is not above the average of the proportion of gluten contained even in our New York and western flours. Mr. Walter, in his "Letters from the Continent," describes the process for fabricating macaroni, which is very simple, and adds: "It is my firm belief that if any spirited individual would commence its manufacture (in England) on an extensive scale, the Italian macaroni would soon cease to be an article of importation."—(*London Quarterly Journal of Agriculture, vol. II.*, p. 462.) I have no doubt that this manufacture might be successfully carried on in various parts of the United States, especially if some care was used in the selection of those kinds of flour which are known to be rich in gluten.

duced to from 8 to 10 per cent., and this is nearly the quantity of moisture contained in the hard and horny wheat of warm countries.*

In five analyses of London flours by Mr. J. Mitchell, the proportion of water varies from 14.10 to 17.40 per cent.†

The proportions of water in the above samples range much higher than those given in the analyses of various flours performed by Vauquelin, which are from 8 to 12 per cent. They are also higher than those in the United States flours, the range of moisture being in the samples which I have analysed from 12 to 14 per cent.

This difference in the proportion of water, which seems to be a matter of so much consequence, is undoubtedly, in part, due to the difference in the climate of the region in which the wheat is grown. This, indeed, is so well understood to be true, that the amount of bread obtained from different kinds of wheat flour is referred to the same cause. Thus "it has been shown by a comparative experiment tried some years ago upon Scotch and English wheat of apparently equal quality, that a quarter of the latter, though yielding rather less flour, yet when made into bread gave 13 lbs. more than the former. This is accounted for by the greater strength of sunshine, under the climate of England, having an effect upon the grain when ripening, which occasions the flour to absorb more water in the formation of dough."‡

From experiments which seem to be trustworthy, it appears that the Alabama and the southern wheat flours, generally, yield more bread than the northern or western. The gain in favor of the Alabama, as compared with the Cincinnati, is said to be 20 per cent. It is also stated by one of the most extensive London bakers, that American flour will absorb 8 or 10 per cent. more of its own weight of water in manufacturing it into bread or biscuit than the English wheat. The English wheat of the same variety with the American is invariably a larger and plumper berry. This is attributed to the longer time required for ripening in that comparatively cooler and damper climate. The American, on the contrary, in ripening under a hot sun, evaporates a larger proportion of water, and leaves the farina in a more condensed state, and when exposed again to moisture in cooling, it absorbs the additional quantity above stated. This is an important fact of which the dealer and consumer should be fully aware.§

No apology is necessary for the details which will be presented concerning the effect of water or moisture upon this cereal, as it is a subject worthy of the most serious consideration. Although, as has been observed, the proportion of water in the wheat and wheat flour of the United States is generally less than in those of England, France, and the north of Europe, it is often in sufficient quantity to cause great losses, especially when shipped to tropical

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* Rural Economy.
† Treatise on the Falsification of Food, &c.
‡ Penny Magazine, vol. 75.
§ From an article in the Toronto (Canada) Herald.

countries. So early as the year 1814, attention was directed to this in a valuable series of papers published by Mr. Jonas Humbert, of New York,* a large dealer in flour, and at one time a deputy inspector of that article. He states that since the revolution, the price of the New York wheat flour in the markets of Europe and the West Indies had been gradually falling below that of Pennsylvania and Virginia. He asserts as the result of his own experiments, that the New York flour is equal to that obtained from wheat raised in any other State or country; and he attributes the deterioration in the price of the former to carelessness on the part of those who are engaged in its preparation and shipment. Among the points which he enumerates are, a want of attention to the ventilation and proper drying of the grain before it is ground, the rapid and improper mode of grinding, regrinding the middlings, and mixing therewith the portion first ground,† and also the still more objectionable practice, perhaps still followed, of mixing old and spoiled flour with newly ground wheat.

It is stated that in Poland, where the ventilation and drying are continued for some time, wheat has been preserved sound and good for half a century; its age never does it injury, and such wheat is said to yield handsomer and better flour than that obtained from the grain more recently harvested.‡ In Dantzic, the preparation for keeping wheat continues for a year and sometimes longer; after this period it is often kept for seven years perfectly sound in the large granaries of that place, although surrounded by the sea.

In regard to American wheat and wheat flour, it may be remarked, that the proportion of water naturally existing in them is often increased by carelessness in harvesting the grain, and in its transport and storage. In one sample of Indiana wheat flour recently analysed, which was sour and had but little more than one half the usual quantity of gluten, the injury was probably caused by the hurried mode of packing, for the changes above noticed occurred before the opening of summer. Sometimes, however, our flour is spoiled by being stored in damp, warm, and ill ventilated warehouses. The books of one inspector of the city of New York, shows, that in 1847 he inspected 218,679 barrels of sour and musty flour. He certifies that in this amount he is of opinion that there

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* Transactions of the Society for the Promotion of Useful Arts in the State of New York, vols. III and IV.

† Mr. Humbert objects to the mixing of the produce of the first and second grinding, and putting up the whole for superior flour. "To the eye," he says, "this mass appears very fine; but when mixed with water it is very deficient in elasticity, and on being worked with the hand, is similar to clay mixed with water." The mode of management here spoken of is no doubt resorted to from improper motives; but whatever may be the difficulties in working such a mixture, it so happens that it contains more nutritive matter than the fine flour alone. But of this, more hereafter.

‡ It will be seen, however, that the flour from the samples of Poland wheat which I have analysed, yielded comparatively small proportions of gluten. All the samples were in excellent condition, and seemed to have sustained no injury by shipment. But from some experiments which I have made, I am induced to believe that wheat which has been long kept may suffer a diminution in the amount of gluten without presenting any external evidence of the change which has taken place. Wheat flour, when carefully managed in the mode hereafter to be described, retains its nutritive matter in a more stable form. If this view is correct, it should have some influence in determining the best mode of keeping breadstuffs for future use or for shipment

was a loss sustained of $250,000.* But as no flour that is known to be sour or bad is inspected, this statement gives a very imperfect idea of the loss incurred, even in that city. The total amount of loss for the whole United States arising from chemical changes in breadstuffs by internal moisture, has been estimated at from $3,000,000 to $5,000,000.

Some remarks upon this subject, recently published† by Mr. Brondgeest, of Hamilton, Canada west, deserve to be here introduced. This gentleman has paid much attention to the preservation of food, both as a merchant and as president of the board of trade of Montreal and of Hamilton. He notices an article on the "Preservation of Food," in the January number of the Westminster, the author of which proposes the exclusion of air, by an air pump or otherwise, as a remedy for the injuries sustained by breadstuffs, and very justly observes that these extreme measures are wholly unnecessary, as arrangements perfectly feasible will answer the purpose. He admits the necessity of something being done, as "the present system is wasteful, and contrary in many respects to common sense; the warehousing of grain is defective in every point of view. The common mode of shipping wheat or other gain in bulk, is the cause of injury with American grain, and I doubt not also with the European. The emptying of grain loose into barges not over dry;‡ spray and moisture on the voyage to the shipping port; exposure to weather while being shipped, damp lining boards, damp vessels, damp during the voyage, and then again being exposed in a lighter and put away in a damp warehouse, or in a low situation on the bank of a river; all tend to the destruction even of the finest particles of grain."

As remedies for all these injurious influences, Mr. Brondgeest proposes the shipment of grain in barrels like flour, and the proper kiln-drying of such varieties as are known not to keep well. The souring of flour, either on the river or sea voyage, or after warehousing, he adds, "can be perfectly prevented by the use of the kiln, either to the flour, or the wheat prior to grinding; one-third to one-fifth of the wheat being highly dried makes the whole keep perfectly for years, and that third or fifth may be of the cheap spring grain, making much stronger and better flour; but which if not kiln-dried would sour the whole."

In the report of the Commissioner of Patents, dated March, 1844, there are some statements of interest in regard to kiln-dried flour and meal. From these it appears that Ohio flour, after hav-

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* Observations on the Production, Manufacture, and Preservation of the Cereal Grains; by J. R. Stafford.

† Westminster Review, for October, 1848.

‡ A gentleman residing in the city of Albany, N. Y., informed me that during the past season he witnessed an operation which, if generally performed, will sufficiently account for all the losses sustained in the shipment of the cereal grains. Several persons were engaged in transferring wheat from a canal boat to a river barge; and, while this was going on, it was the business of one of them to sprinkle the grain quite freely with water, containing in solution a portion of common salt. As soon as one pail-full was exhausted, another was prepared; and the effusion was continued until the work was completed. The addition of the salt to the water was a mere cover for a really fraudulent and most reprehensible operation.

ing been subjected to the drying process, was kept in the southern and South American ports in good merchantable order, and in weather in which other flour not thus prepared invariably spoiled. The process of drying, here noticed, was conducted by the employment of hot air; and Mr. Gill, who claims the invention, states that 18 pounds of water are thus expelled from a barrel of flour.

There can be no doubt, therefore, that the removal of a portion of the water which wheat flour and maize meal naturally contain, is the easiest and best means of preserving them. But the drying process, simple as it may seem, requires to be carried on with great care. The passage of the grain or flour, however rapidly, over highly heated surfaces is apt to scorch, and thus give them an unpleasant flavor. From the rapid evolution of the moisture in the form of steam by the heat thus applied, unless proper ventilation be also secured, further injury will probably result. The steam again condensing into water upon the cooling of the flour, may accumulate in particular parts of the mass operated on, and thus, perhaps, render it at least equally as liable to injury as it would have been without the employment of this process.

Another fact which I have observed in those samples of wheat flour that have been exposed to a degree of heat high enough to expel all the water is, that the gluten is less tough and elastic—a proof that its quality has been impaired. It is probable that the proportions of dextrine and glucose may thus also be increased at the expense of the starch. Under these circumstances, a subsequent exposure to moisture and a slight elevation of temperature, establishes the lactic acid fermentation, which, I suppose, is the chief cause of the *souring* of flour.

The advantages to be derived from artificial drying, are more fully attained by the invention patented by Mr. J. R. Stafford in 1847, than by any other plan with which I am acquainted. It is based upon the process for drying organic bodies usually adopted in the laboratory. The grain or flour is brought into contact with a surface of metal heated by steam, and a due degree of ventilation, so important to the completion of the drying, is secured. As the heat is not raised above that of boiling water, there is no danger of injuring the quality, color, or flavor of the substances subjected to its action. The heat is, moreover, uniform, and the expense is said to be less than that of the mode of drying heretofore generally adopted. By Mr. Stafford's apparatus 16 or 17 pounds of water are expelled from each barrel of flour; this reduces the proportion of water to four or five per cent., an amount too small to be productive of injury. Absolute dryness cannot be easily attained except by a long exposure of the flour to the heat, and it is not required for its preservation; a reduction of the amount of water to the small per centage just stated, has been found to be amply sufficient to secure this object. I cannot, in my opinion, render a more important service to dealers in breadstuffs, than to recommend strongly the employment of this or a similar process of drying.

After the proper ventilation and drying of the grain has been effected, there is still another point deserving of some consideration. This is the absorptive power of the different kinds of flour, which I have found by experiment to be subject to considerable variation. The amount of moisture absorbed by the various samples which have been tried, after having been brought to a state of absolute dryness, ranges from 8 to 11.65 per cent. by an exposure to the air of a room, for from 18 to 24 hours. This difference in the hygrometic character of flours, must, I think, have an influence upon their preservation, and will perhaps account for the fact, that with the same degree of carelessness and the same exposure, some kinds are more liable to spoil than others. The remedies for all the difficulties to be apprehended from this source, are the employment of tight barrels, and the avoidance of all unnecessary exposure of their contents to the air.

Some remarks may be added more definitely to explain the various modes in which wheat flour, especially, is injured by the presence of an undue proportion of water under the influence of a warm climate. The general result is a diminution in the quantity of gluten, or such a change in its quality as renders it unfit to produce good panification. It sometimes also favors the formation of sporules of different kinds of mushrooms which are afterwards developed in the bread.

Dumas states that the wheat of 1841, exhibited in 1842, during a very warm summer, this defect in a very great degree. When these mushrooms were developed, the temperature was much elevated, and the bread soon disappeared, leaving only a reddish and disgusting mass.

The number of sporules was much diminished by the thorough washing of the infected grain, followed by prompt desiccation. By reducing the proportion of water, increasing the dose of salt, and finally by raising the temperature of the oven, the development was in a measure prevented.*

A few years since, I observed reddish sporules similar to those above noticed in a sample of New Jersey flour. The change took place in twenty-four hours after it had been made into a paste with water. On repeating the experiment, the same result followed.

According to Dumas, moisture and heat which often cause such changes in the most important constituent of wheat flour, produce very little effect upon the starch which it contains. Although it is with some hesitation that I dissent from such high authority, the following facts appear to me to show that this idea is an incorrect one:

Starch is known to be composed of particles which are insoluble in cold water, but when exposed to a heat of 180° F., the pellicle of the grain bursts, and the contents are liberated. In a state of solution, it is quickly converted into dextrine and glucose, or grape sugar, by the addition of a small quantity of diastase.† If

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* Dumas, Chimie Appliquée aux Arts.

† This is a peculiar nitrogenous principle which exists in the grain of the cereals after germination commences.

this mixture be kept in a warm place for a few days, it acquires a new property, viz: that of converting the glucose into lactic acid. This is denominated the *lactic acid fermentation;* and, as I have before suggested, it is probably one of the causes of the *souring* of flour when exposed to high summer heats in its ordinary moist condition. Hence it will be found that, while in sour flour the quantity of gluten is usually diminished, or its quality injured, the proportions of glucose and dextrine are also, in many cases, increased at the expense of the starch—a change which precedes the development of the lactic fluid.

One of the best modes of determining the real value of wheat and other flours, is to examine the bread made from them. The process of panification brings out all their defects, and as the researches upon breadstuffs are conducted chiefly with the view of ascertaining their suitableness for the manufacture of bread, it affords a good standard of comparison for the various samples subjected to experiment. It should be remembered, however, that bread is sometimes adulterated for the very purpose of enabling those who are engaged in its fabrication to use the poorer kinds of flour. Thus, Dumas states that in Belgium and the north of France, sulphate of copper (blue vitriol) has long been introduced into the manufacture of bread. By the employment of this salt, the bakers can use flour of middling and mixed quality; less labor is required in its preparation, the panification is more speedy, and by its addition a larger quantity of water is taken up.*

The use of alum in the fabrication of bread seems to have been practiced from a remote period. This, it is said, also secures to the baker the advantage of employing inferior kinds of wheat flour, and even of mixing with the farina of beans and peas, without apparently injuring the quality of the bread.

The alkaline carbonates, the carbonate of magnesia, chalk, pipe clay, and plaster of Paris, have all been used, either to correct the acidity of damaged flour, to preserve the moisture, or to increase the weight and whiteness of the bread. But it need scarcely to be observed that all these substances, with perhaps the exception of small additions of the alkaline carbonates, must render the bread unwholesome. Fortunately, however, the presence of most of them can be quite easily detected.

Other frauds which have been resorted to are more difficult of detection; but these are, happily, less prejudicial to health, although not always perfectly harmless. Among these may be mentioned the adulteration of wheat flour with potato starch, the flour of leguminous plants, buckwheat, rice, linseed, &c. Mareska, in a recent paper, states that he has had occasion to examine several samples in which these frauds had been practiced, and he describes several processes by which their occurence may be ascertained.†

According to a statement made by a quartermaster in the United

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* Traité de Chimie Appliquée aux Arts, vol. VI., p. 429.

† Journal de Pharmacie—quoted in the London Pharmaceutical Journal, for February, 1848, p. 394.

States army, one barrel of flour, or 196 pounds, when in dough, contains about 11 gallons, or 90 pounds of water, 2 gallons of yeast, and 3 pounds of salt; making a mass of 305 pounds, which evaporates in kneading and baking about 40 pounds, leaving in bread about 265 pounds; the bread thus exceeding in weight the flour employed by about 33.50 per cent.

Dumas informs us that 130 pounds of the common white bread of Paris are obtained from 100 pounds of flour. To this he adds, that the flour contains 17 per cent. of water, the produce being then equivalent to 150 pounds of bread from 100 pounds of flour.* As the American wheat flour seldom contains more than 14 per cent. of water, the statement of the quartermaster corresponds very nearly with that of the French chemists. The increase of weight in the bread over that of the flour, viz: 33.50 per cent., ought to afford an ample remuneration for its manufacture. But it is not unfrequently the case that larger demands are made by those who are engaged in this important branch of art.

The deficiency in the weight of bread, and the extent of the imposition practiced in the sale of loaves at a certain price, can, in general, be very easily ascertained. For example, the proper weight of the shilling loaf (New York currency) may be determined by reducing the price of flour to shillings, and then dividing 196 by this amount. Thus, the price of flour being $7 a barrel, (which is a sufficiently high average for even the best brands during the year past,) the shilling loaf should weigh three and a half pounds. For,

$$7+8=56;\ 196\div56=3.50.$$

This will leave twenty loaves of the same weight, or $2 50 as the profit on the manufacture.

Although the whiteness of bread is considered as a mark of its goodness, it has been ascertained by Professor Johnston that fine flour contains a less proportion of nutritive matter than the whole meal. The correctness of this view has been confirmed during the present investigation; for, in two or three samples of wheat which I have analyzed, it was found that the amount of gluten in the fine flour was less than in the flour passed through a coarser sieve and containing a larger proportion of bran.

These results, according to Professor Johnston, are to be accounted for on the supposition that the part of the grain which is most abundant in starch crushes better and more easily under the millstones than that which, being richest in gluten, is probably also tougher, and less brittle. They are also consistent with the greater nourishment generally supposed to reside in household bread, made from the flour of the whole grain.† But such is the controlling influence of custom, that it is perhaps in vain to attempt a change, even though its benefits may be clearly proved by the researches of science, and by an extensive experience.

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* Boussingault gives the same proportions for the white bread of Paris. But he says, in the country, where the bread is less baked, 100 parts of flour give 140, 145 and 146 of bread. —*Rural Economy*, p. 173.

† Highland Society Transactions, 1847; and Skinner's Farmers' Library, vol. III. pp. 142 and 143.

ANALYSES OF WHEAT FLOUR.

Before presenting the details of my analyses, it may not be amiss to offer a few explanations in regard to some researches of a similar kind, which have heretofore been made. The discrepancies in the published results of various analyses arise principally, I apprehend, from the different processes which have been employed.

The table published in Davy's Agricultural Chemistry gives the proportions of gluten or albumen in English Middlesex wheat at 19.00 per cent.; in Sicilian wheat, 23.90 per cent.; in Poland wheat, 20.00 per cent.; and in North American wheat, 22.50. The mode pursued by this celebrated chemist has not, so far as I know, been published, but the amount of the nutritive principle is larger than that usually obtained, a circumstance which may perhaps be ascribed to its being imperfectly dried.

In the table containing the results of Vauquelin's analyses of wheat flours, the proportions of gluten are generally much lower than those obtained by Davy. Thus, in common French flour, the gluten is 10.96 per cent.; flour of hard Odessa wheat, 14 53 per cent.; flour from the bakers of Paris, 10.20 per cent.*

Boussingault, adopting the plan of determining the amount of azotized principles by immediate ultimate analysis, has obtained a larger per centage of the nutritive principle than either of the above named chemists. Thus he states that the hard African wheat contains of gluten and albumen, 26.50 per cent.; Sicilian wheat, 24.30 per cent.; Dantzic wheat, 22.70 per cent. He gives reasons which, to a certain extent, account for the larger quantity of azotized principles which he found in the samples of flour, and adds, "that the varieties of wheat, the flour of which was analyzed, were all grown in the rich soil of the garden, a circumstance which, as Hermbstadt has shown, exerts the most powerful influence in increasing the quantity of gluten in wheat."†.

Dr. Robert D. Thomson has also published the results of several analyses of wheat flour. The proportion of the nutritive principle was deduced from the quantity of ammonia formed from the azote contained in the sample. According to this chemist, Canada flour contains 13.81 per cent. of the nutritive principle, (gluten and albumen;) Lothian flour, 12.30 per cent.; United States flour, 11.37 per cent., and another sample of the same, 10.99 per cent.‡

It is not easy to understand why Canadian flour should rank so much higher than that from the United States. The sample named Canadian flour in the table may have been, in fact, brought from this side of the line, for it is stated that our wheat is carried to Canada, there ground into flour, and taken to England under Canadian duty.§ One house at Cleaveland is said to have shipped, during the last summer and fall, 36,000 bushels of wheat, which

* Dumas, Traité de Chimie Appliquée aux Arts, vol. VI., pp. 388 and 389.
† Rural Economy, p. 176.
‡ London Medical Times, July 29, 1843.
§ Report of the Commissioner of Patents for 1844, p. 400.

was ground at St. Catharine's, on the Welland canal, and sent to London under contract.

Mr. Mitchell, in his analyses of various London flours, obtained the following proportions of gluten, viz: in fine flour, No. 1, 9.50 per cent.; in No. 2, 11.40 per cent.; in second flour, No. 1, 8.50 per cent.; in No. 2, 7.70 per cent.*

After mature consideration, I determined to adopt the mode of analysis which shortly consists in separating the gluten by washing with cold water, and then subjecting the remaining constituents of the flour to other operations. I preferred this process, as being more easily executed, requiring less apparatus, and less skill and nicety of manipulation, than are demanded in the ultimate analysis. I have little doubt, moreover, that, for the practical purposes of this investigation, it is equally, if not more, accurate; for, with all the improvements which have been made in the method of determining the amount of nitrogen in organic substances, it is not yet free from difficulties. I may also add that the ultimate analysis fails to give us any information concerning the peculiar nature of the gluten—a point which is, perhaps, of as much consequence in settling the real value of flour as the amount of that principle.

The different steps of the analyses have, in all cases, been conducted with as much uniformity as possible; one important object being to furnish a table of results which should at least show the *relative* value of the different samples subjected to trial.

All the samples from abroad were received in tin boxes or glass bottles carefully closed, so as to prevent the access of external air. Thus, whether damaged or not, they were probably in nearly the same condition when they came into my hands as they were when put up.

In proceeding with the analysis, 100 grains of the flour were put into a small Berlin ware capsule, which had been previously counterpoised in a delicate balance. The capsule, with its contents, was then placed in a water bath drying oven, and subjected to a heat of about 212° Fahrenheit, for from three to six or seven hours, or until after rapid weighing there was found to be no further diminution of weight. The proportion of water in the sample was thus determined by the weight required again to balance the capsule and its contents.†

A weighed portion of the flour, usually 100 grains, was next carefully kneaded into a stiff paste or dough by the cautious addition of pure water, and the dough thus formed allowed to remain in the cup for a few minutes. A fine linen cloth was stretched over the top of a bolting cloth sieve, and this again placed in a large Berlin ware dish. The dough was now washed on the hand over the sieve and cloth with a small stream of water, and gently

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* Treatise on the Falsifications of Food, &c., pp. 46 and 47.

† I have lately employed a small paper tray instead of the capsule. It is equally convenient, and the drying is more rapidly effected.

kneaded, from time to time, until all the starchy particles and the soluble matters were removed. The tough gluten was washed until the water ceased to become milky, and after being carefully pressed out by the fingers was subjected to the heat of a water-bath until perfectly dry, an operation which sometimes occupied 10 or 12 hours. It was then weighed while warm and the amount noted.

A sufficient quantity of water was now poured upon the linen cloth to carry down the starch, while any small particles of gluten, washed off during the operation, were added to the mass. In those cases where the flour contained any considerable proportion of bran, the latter substance was found upon the linen cloth.

The turbid washings were allowed to remain in the vessel until the whole of the starch was deposited. The supernatant liquor was then removed by a pipette, the starch again washed, and the wash water removed as before. The starch was now dried, subjected to the heat of the water-bath to expel all the water, and then quickly weighed. The clear liquor, removed from the starch, was evaporated at a boiling heat to near dryness, the complete dessication being effected at a temperature of about 220° or 230° Fahrenheit. In some cases, a few flocks, probably albumen, were observed floating in the liquid during the evaporation, but the quantity was usually so small that I did not attempt to separate it. The residuum thus obtained was principally a mixture of sweet and gummy matter, with small proportions of woody fibre and saline substances. As I ascertained that the sugar was the variety called glucose, or grape sugar, and the gummy constituent was supposed to be dextrine, I have placed all the results of the evaporation of the clear liquor under these two heads.

I may remark, that the gluten obtained by this process contains a small quantity of an oily matter, which I supposed to be about equal to that of the albumen in the clear solution separated from the starch. The proportions of gluten given in the following analysis will, therefore, very nearly represent the amount of nutritive matters contained in the various samples.

In most cases I carried out the analysis to the end, obtaining and weighing the several substances; but as the principal object was to determine the quantity and quality of gluten, the process was occasionally stopped at this point. In a few other instances the proportions of gluten, glucose and dextrine, were determined directly, while the quantity of starch was estimated by difference.

For convenience of reference, the analysis are arranged under the head of the several States from whence the specimens were obtained. I regret that the number received from the south is so small, as I was very anxious to exhibit in one view the relative quantities of nutritive matter in the northern and southern flours. Should the investigation be continued, this point will claim my earliest attention.

Several varieties of wheat, sent from Amsterdam, have been analyzed, (after being ground to fine flour,) principally for the purpose of comparing the results with those obtained from the samples from the United States.

RESULTS OF THE ANALYSES.

NEW JERSEY.

I. Sample of wheat flour purchased at a store in New Brunswick.

Water	12.75
Gluten*	10.90
Starch	70.20
Glucose, dextrine, &c.	6.15
	100.00

II. Sample of wheat flour purchased at a store in New Brunswick.

Water	12.35
Gluten	8.31
Starch, glucose and dextrine	79.34
	100.00

The gluten was inelastic, as well as reduced in quantity. The flour had suffered by constant exposure, while sold at retail during the summer. This is almost invariably the result of this mode of selling flour, as it is scarcely possible to prevent the deteriorating action of air and moisture. But the extent of the injury which sometimes occurs, is no doubt due to the carelessness of the seller.

NEW YORK.

III. Wheat flour from pure Genesee wheat. P. Garbut's mills, Wheatland, Monroe county. (From Mr. E. A. Durant, Albany, N. Y.)

Water	13.35
Gluten	12.82
Starch	68.00
Glucose, dextrine, &c,	6.50
	100.67

IV. Wheat flour branded "Excelsior," manufactured expressly for Messrs. Lay & Craft, Albany, N. Y. From extra pure Genesee wheat, Rochester, N. Y. (From Messrs. Lay & Craft, Albany, N. Y.)

Water	12.40
Gluten	11.46
Starch	70.20
Glucose, dextrine, &c.	5.20
	99.26

* It is to be understood that the gluten is of good quality, unless otherwise stated.

V. Wheat flour with the brand "Julian Mills, from new wheat," (1848,) extra superfine, Genesee; J. B. Chipman. (From Albany, N. Y.)

Water	12.50
Gluten	11.75
Starch	70.10
Glucose, dextrine, &c.	5.50
	99.85

VI. Wheat flour, with brand "Super extra, Genesee, Lake Mills, Port Byron, N. Y., J. H. Beach." (From Messrs. Hewitt & Co., Albany, N. Y.)

Water	13.60
Gluten	12.00
Starch	67.60
Glucose, dextrine, &c.	6.80
	100.00

The gluten was of a very fine quality. Except for the larger proportion of water, this is one of the best samples from New York.

VII. Wheat flour, branded "Pure Genesee flour, Granite Mills." (From Messrs. Reed & Rawls, Albany, New York.)

Water	13.00
Gluten	11.90
Starch	67.20
Glucose, dextrine, &c	6.90
	99.00

OHIO.

VIII. Extra pastry flour, manufactured by Beaumont & Hollingsworth, Zanesville. (From Messrs Lay & Craft, Albany, New York.)

Water	12.85
Gluten	14.25
Starch	67.06
Glucose, dextrine, &c.	5.98
	100.14

This is a remarkable sample, the gluten being not only in large proportion, but of a very fine quality. I regret that I have been unable to obtain any information in regard to the variety of wheat from which the flour was manufactured. If grown in Ohio it must have been the produce of a very rich soil.

IX. Flour from Ohio, wheat ground in Ohio. (From Mr. John S. Smith, Albany, New York.)

Water	12.00
Gluten	11.90
Starch	68.57
Glucose, dextrine, &c	6.95
	99.42

X. Wheat flour, branded "Empire Mills, Roscoe, Ohio." (From Messrs. Reed & Rawls, Albany, New York.)

Water	13.00
Gluten	10.00
Starch	70.20
Glucose, dextrine, &c	6.80
	100.00

The gluten was of a good quality, but in smaller proportion than in the other Ohio samples. The flour was very finely ground, which may, in part account for the difference.

XI. Wheat flour, from cargo shipped on board Venice, Venice Mills, Xenia, Ohio. (From the Collector at Buffalo, New York.)

Water	12.36
Gluten	12.60
Starch, glucose, dextrine, &c (by diff.)	75.04
	100.00

INDIANA.

XII. Flour from Indiana wheat (1848.) Branded "Forrest Mills, (Logansport,) extra-superfine, W. Beach." (From Messrs. Hewitt & Co., Albany, New York.)

Water	12.85
Gluten	11.90
Starch	67.00
Glucose, dextrine, &c	8.25
	100.00

XIII. Flour from Indiana wheat (1847.) Branded "Forrest Mills, (Logansport,) extra-superfine, W. Beach." (From Albany, New York.)

Water	13.00
Gluten	7.00
Starch	67.80
Glucose, dextrine, &c.	11.30
	99.10

This sample was sour, and I was informed that it was in this condition when it arrived at Albany early in the spring of 1848. As it was probably ground during the previous autumn, and had not therefore been exposed to summer heat, it must have been put in barrels without due attention to its dryness. The gluten was not only reduced in quantity, but had entirely lost its elasticity, breaking up, during the washing, into shreds which were removed from the linen cloth. A portion of the soluble part, placed under glucose and dextrine, was probably lactic acid, to which the acidity is to be ascribed. The loss which occurred upon this cargo of flour might have been saved by the employment of the kiln-drying process previously noticed.

XIV. Wheat flour, from a cargo shipped on board the schooner Amelia, from Delhi, Indiana. (From the collector at Buffalo, New York.)

Water	11.78
Gluten	11.30
Starch, glucose, dextrine, &c. (by diff.)	76.37
Bran*	0.55
	100.00

ILLINOIS.

XV. Wheat flour, branded "Oswego flour," but said to have been ground from Chicago wheat. (From Messrs. Reed & Rawls, Albany, New York.)

Water	12.90
Gluten	11.25
Starch	66.00
Glucose, dextrine, &c	8.60
Bran	1.25
	100.00

This flour was of a dark color, and said to be scarcely fit to pass inspection. But the gluten was of an excellent quality, and its proportion was above the average of the western samples. I attribute this partly to the very fact which rendered it doubtful to the inspector, viz: its being coarsely ground, and thus containing a larger proportion of the whole meal.

* In many cases the quantity of bran was so very small, that I did not think it worth while to institute a separate process for its determination.

XVI. Wheat flour, from a cargo shipped on board the steamboat America, from Rock river, Illinois. (From the collector at Buffalo, N. Y.)

Water	13.87
Gluten	9.90
Starch, glucose, dextrine, &c., (by diff.,)	75.88
Bran	0.35
	100.00

MICHIGAN.

XVII. Flour, from Michigan wheat, ground at Livingston's mills, Michigan. (From Mr. E. A. Durant, Albany, N. Y.)

Water	14.05
Gluten	10.35
Starch	68.35
Glucose, dextrine, &c	7.14
	99.89

XVIII. Wheat flour from the Bruce mills, Michigan. (From Messrs. Reed & Rawls, Albany, N. Y.)

Water	13.20
Gluten	11.85
Starch	65.60
Glucose, dextrine, &c	8.60
Bran	0.45
	99.70

I attribute the relative richness of this sample to its not being so finely ground as some others.

XIX. Wheat flour, from a cargo shipped on board the steamer Clinton, from Monroe, Michigan. (From the collector at Buffalo, N. Y.)

Water	13.10
Gluten	10.40
Starch, glucose, dextrine, &c., (by diff.,)	76.30
Bran	0.20
	100.00

WISCONSIN.

XX. Flour from Wisconsin wheat, ground in Wisconsin. (From Mr. John S. Smith, Albany, N. Y.)

Water	13.80
Gluten	10.85
Starch	67.00
Glucose, dextrine, &c.	8.33
	99.98

XXI. Wheat flour, from the Solon mills, Wisconsin. (From Messrs. Lay & Craft, Albany, N. Y.)

Water	12.30
Gluten	10.40
Starch	68.50
Glucose, dextrine, &c.	8.60
	99.80

XXII. Wheat flour, from a cargo shipped on board propeller Delaware, from Milwaukie, Wisconsin. (From the collector at Buffalo, N. Y.)

Water	12.75
Gluten	9.85
Starch	66.02
Glucose, dextrine, &c.	11.05
Bran	0.33
	100.00

This sample had suffered some deterioration. The amount of gluten was diminished, and it was of an inferior quality. The proportion of soluble matters was correspondingly increased.

GEORGIA.

XXIII. Wheat flour, from Floyd county, Georgia. (From W. B. Bullock, esquire, collector at Savannah.)

Water	11.75
Gluten	14.36
Starch	68.93
Glucose, dextrine, &c.	4.96
	100.00

The analysis of this sample fully confirms the correctness of the prevailing opinion concerning the superior richness of the southern

flour. The sample of Georgia wheat received with the preceding, when opened during the summer, was found to be filled with a dark colored beetle, the weevil, (*calandra granaria.*) The insect was about one-eighth of an inch in length, and entirely resembled that described by W. Gaylord, esquire, as occurring in a sample of Mediterranean wheat.* Some of the kernels were entirely consumed, and had nothing but the chaff remaining. It was curious to see the manner in which these insects simulated death when disturbed, or when I endeavored to remove them from the wheat and to place them under an inverted test glass. It is said that if the wheat be kiln-dried, the weevil is effectually destroyed.

WEST INDIES.

Two samples were received from Turks Island, from John T. Pickett, esquire, American consul. One of them had not suffered from the voyage—the other was injured.

XXIV. Wheat flour from Turks Island, labelled "from New York, 'Oswego mills;' 20 days at sea, and about 15 days here."

Water	12.60
Gluten	12.70
Starch	66.00
Glucose, dextrine, &c	8.50
	99.80

This flour was in good condition, and the gluten was of an excellent quality. It is one of the best samples of New York flour, and must have been put up with great care.

XXV. Wheat flour from Turks Island, labelled "from Baltimore, via St. Thomas; 10 days on shore there and four months at this place; 'Western mills;' inspection of 1848."

Water	12.60
Gluten	11.90
Starch	63.30
Glucose, dextrine, &c	11.30
	99.10

This flour had an unpleasant, musty smell, and was filled with insects about one-sixth of an inch in length, probably a species of weevil. The gluten was of a dark color, and although its elasticity was not destroyed, it had undergone some change. Although not actually sour, it became so by a short exposure in contact with water. A portion of the starch had been changed into dextrine by

* Transactions of the New York State Agricultural Society for 1848, p. 143.

the incipient fermentation. This flour must have been originally very rich in gluten; but it had been subjected to a severe trial, as is evident from the label.

HOLLAND, RUSSIA, AND POLAND.

One sample of wheat flour, and sundry boxes of wheat from Holland, Russia, and Poland, were received from P. A. Bundten, broker, Amsterdam. They were all in excellent condition, but I regret that the time when the wheat was harvested was not added. I infer from my analyses, perhaps incorrectly, that all other things being equal, wheat is more liable to suffer a diminution in the quantity of gluten than wheat flour. I shall hereafter pursue this point in reference to our American samples, as it seems to me to be of great practical importance.

The specimens of wheat were all carefully ground in a hand mill, and then passed through the finest bolting cloth. The flour thus obtained usually had from one to one and a half per cent. of bran; but, as I supposed this to be owing to the mode of grinding, &c., which I was obliged to employ, the amount was deducted, and the calculations of the proportions of the other constituents made accordingly.

XXVI. Flour from Zealand wheat (received in the form of flour.)

Water	13.30
Gluten	12.50
Starch	67.50
Glucose, dextrine, &c.	6.20
Bran	0.50
	100.00

This flour was coarsely ground, but it was of an excellent quality.

XXVII. Flour from Poland wheat.

Water	13.60
Gluten	10.65
Starch	68.15
Glucose, dextrine, &c.	7.60
	100.00

XXVIII. Flour from Zealand wheat.

Water	13.40
Gluten	10.25
Starch	69.65
Glucose, dextrine, &c	6.70
	100.00

XXIX. Flour from soft Petersburg wheat.

Water	13.20
Gluten	11.00
Starch	69.00
Glucose, dextrine, &c	6.80
	100.00

This is a red wheat, with a very small berry. The gluten is sufficiently elastic, but of a very dark color. An inferior variety, and one which would be little valued in this country.

XXX. Flour from Friesland wheat.

Water	13.90
Gluten	10.00
Starch	69.75
Glucose, dextrine, &c	6.10
	99.75

XXXI. Flour from red Poland wheat, imported by Odessa. The first column exhibits the amount of gluten in the flour more coarsely ground than in the second, which was very fine.

	One.	Two.
Water		13.30
Gluten	10.80	9.95
Starch		67.25
Glucose, dextrine, &c		9.50
Bran	0.90	
		100.00

The gluten was of a good quality, but dark colored when dry.

XXXII. Flour from Kubanka wheat, imported by Russia. I made two analyses, the first of the more coarsely ground flour.

	One.	Two.
Water	12.35	
Gluten	16.00	14.75
Starch	59.65	
Glucose, dextrine, &c	9.00	
Bran	2.90	1.95
	99.90	

This very remarkable variety of wheat, I suppose to have been grown on the Kuban river in southern Russia. It has a very thick husk and yields a yellowish flour, not unlike maize meal. Pallas describes a variety of Greek or Arnaut wheat sown on the coast of the sea of Azof, which agrees with this very nearly. It "has a

large bright yellow grain somewhat transparent, and is, in preference to any other, exported to Turkey and Italy. It yields a yellowish, very savory flour, that is in much request for making maccaroni; it requires, however, a very rich soil."*

This wheat seems to me to be worthy of a trial in the United States. If under our culture it should yield the proportion of gluten above stated, it would be of great value. The color of the flour might perhaps be an objection to its use for making bread, but it would answer well for the manufactures of maccaroni and vermicelli.

XXXIII. Flour from Kubanka wheat, imported by Odessa.

Water	12.35?
Gluten	15.25
Starch, glucose, dextrine, &c.	71.10
Bran	1.30
	100.00

The wheat and flour of this sample are similar in appearance to the preceding. It seems to be equally rich in gluten.

* Pallas's Travels in the Southern Provinces of Russia, vol. II., p. 386.

Table exhibiting the composition of various samples of American and foreign wheat flour, by Lewis C. Beck, M. D.

Kind of wheat flour.	Water.	Gluten.	Starch.	Glucose, Dextrine, &c.	Bran.	Total.
I. From New Brunswick, New Jersey	12.75	10.90	70.20	6.15	....	100.00
II. From New Brunswick, New Jersey, (damaged)	12.35	8.31	79.34		....	100.00
III. From Wheatland, Monroe county, New York	13.35	12.82	68.00	6.50	....	100.67
IV. "Excelsior," from Genesee wheat, New York	12.40	11.46	70.20	5.20	....	99.26
V. From Indian Mills, New York	12.50	11.75	70.10	5.50	....	99.85
VI. From Lake Mills, New York	13.60	12.00	67.60	6.80	....	100.00
VII. From Granite Mills, New York	13.00	11.90	67.20	6.90	....	99.00
VIII. Pastry flour, Zanesville, Ohio	12.85	14.25	67.06	5.98	....	100.14
IX. From Ohio wheat	12.00	11.90	68.57	6.95	....	99.42
X. From Empire Mills, Roscoe, Ohio	13.00	10.00	70.20	6.80	....	100.00
XI. From Venice Mills, Ohio	12.36	12.60	75.04		....	100.00
XII. From Forest Mills, Logansport, Indiana	12.85	11.90	67.00	8.25	....	100.00
XIII. From Forest Mills, Indiana, (damaged)	13.00	7.00	67.80	11.30	....	99.10
XIV. From Delphi, Indiana	11.78	11.30	76.37		0.55	100.00
XV. From Chicago wheat, Illinois	12.90	11.25	66.00	8.60	1.25	100.00
XVI. From Rock river, Illinois	13.87	9.90	75.88		0.35	100.00
XVII. From Livingston's Mills, Michigan	14.05	10.35	68.35	7.14	....	99.89
XVIII. From Bruce Mills, Michigan	13.20	11.85	65.60	8.60	0.45	99.70
XIX. From Monroe, Michigan	13.10	10.40	76.30		0.20	100.00
XX. From Wisconsin wheat	13.80	10.85	67.00	8.33	....	99.98
XXI. From Solon Mills, Wisconsin	12.30	10.40	68.50	8.60	....	99.80
XXII. From Milwaukie, Wisconsin	12.75	9.85	66.02	11.05	0.33	100.00

XXIII. From Floyd county, Georgia	11.75	14.36	63.93	4.96	....	100.00
XXIV. From Turk's Island, West Indies, (New York)	12.60	12.70	66.00	8.50	....	99.80
XXV. From Turk's Island, West Indies, (Maryland)	12.60	11.90	63.30	11.30	....	99.10
XXVI. From Zealand Wheat	13.30	12.50	67.50	6.20	0.50	100.00
XXVII. From Poland wheat	13.60	10.65	68.15	7.60	....	100.00
XXVIII. From Zealand wheat	13.40	10.25	69.65	6.70	....	100.00
XXIX. From soft Petersburg wheat	13.20	11.00	69.00	6.80	....	100.00
XXX. From Friesland wheat	13.90	10.00	69.75	6.10	....	99.75
XXXI. From red Poland wheat	13.30	9.95	67.25	9.50	....	100.00
——— .....Do......do.......(coarser)	.....	10.80	.....	....	0.90	......
XXXII. From Kubanka wheat	12.35	16.00	59.65	9.00	2.90	99.90
——— .....Do......do......(finer)	.....	14.75	.....	....	1.95	......
XXXIII. From Kubanka wheat	12.35	15.25	71.10		1.30	100.00

APPENDIX No. 2.

To the Hon. Edmund Burke,
Commissioner of Patents.

Sir: Agreeably to your suggestion that I should collect during my stay in Louisiana, all such information as would be of interest to the sugar planters of the United States, I set out for that State in the middle of October, and arrived in New Orleans, at the beginning of the rolling season. I lost no time in accomplishing my object and visited several plantations, with a view of becoming acquainted with the mode of cultivating the cane, and the improvements for boiling sugar. But, as my investigations progressed, I found that there existed a great many conflicting views, in regard to cane culture, arising from the different kinds of soil, higher or lower locations, and the influence of climate.

It was necessary, therefore, in order to arrive at correct statements, that I should visit other portions of the State, as for instance, Bayou Lafourche, Red River, and all those parishes where the sugar is now and has been heretofore grown, and also those where the planters intend to raise the cane instead of cotton. To accomplish all this, the time allowed me was too short, and I came to the conclusion to transmit to you only a part of the collected facts and drawings and to continue my investigations, if so authorized, during another rolling season.

It is a subject of too great importance to be slightly treated, especially at this moment, when so many cotton planters within the region suitable for the culture of sugar cane, intend to quit the growing of cotton and plant the cane.

The cane has been successfully cultivated for several years in the higher latitudes of Louisiana, and as the profits, arising therefrom, are greater than those from the cultivation of cotton, the production of sugar will necessarily increase in a few years to such an extent, as not only to supply our home consumption, but leave a surplus for exportation. In that portion of the States of Louisiana and Mississippi, where the cane can be raised with advantage, nearly all the cotton plantations will be diverted to the cultivation of sugar. And as the cotton crop in that region amounts to 300,000 bales, we can assume that the same force employed for raising that quantity of cotton, will produce nearly 250,000 hogsheads of sugar. Thus doubling the present crop, without bringing into the calculation the sugar which Texas, Alabama, Georgia, Florida, and the other sugar growing States of the Union will produce. It will thus be seen that it will take only a few years to increase the sugar crop of the United States at least to three times the amount of what it

now is. All the facts emanating from a source like that of the United States Patent office, at a moment like the present, will be of incalculable importance.

With regard to the collection of facts, having relation to the apparatus used in the boiling of sugar, I had less difficulty to contend with; although it is a subject of great moment to the planter, to enable him to produce a sugar which will bear a comparison with the best Havanna, in grain, purity, and whiteness, obtained cheap, with the least amount of fuel and labor. There is no exaggeration in saying, that there is no sugar growing country, where all the modern improvements have been more fairly tested and adopted than in Louisiana, and where such perfect boiling apparatus is used, fulfilling all the conditions that science and experience have pointed out as necessary for obtaining a pure and perfect crystaline sugar, combined with the utmost economy of fuel.

The success of these improved modes is due to the enterprise and high intelligence of the Louisiana planters, who spare no expense to carry this important branch of agriculture and manufacture to its highest perfection. They have succeeded in making, *strictly from the cane juice*, sugar of absolute chemical purity, combining perfection of crystal and color. "This is, indeed, a proud triumph," says Professor McCulloch, in his valuable report to Congress. "In the whole range of the chemical arts, I am not aware of another instance where so perfect a result is in like manner immediately attained."

What was supposed impossible, has been accomplished by the Louisiana planter, notwithstanding the obstacles of the late maturity of the cane, early frosts, and other incidents occurring there, which casualties are unknown to the sugar planter of the tropical regions. But not only in the raising of cane and the manufacture of sugar does the Louisiana planter excel. He deserves also commendation for the manner in which he has embellished his country. His leisure hours are devoted to the beautifying of his estates, thus rendering the margin of the Mississippi a continuation of beautiful villages, surrounded by tropical plants and trees.

I cannot describe the delight I felt when I first entered the State of Louisiana. Its river, the creator of this rich alluvial territory, after having tossed and rolled its mighty waters against the wild shores of the upper country, carrying away and building up, inundating vast tracks and leaving everywhere traces of its destructive sway, begins at once to slacken its current and keep its turbid stream within the bounds of fertile banks, gliding majestically through highly cultivated plains covered with the graceful sugar cane, the uniformity of which is continually diversified by beautiful dwellings, gardens, and the towering chimneys of the sugar-houses, the handsome fronts of which stand forth in the picturesque back ground of the forest, forming an everchanging scene.

The traveller who floats in one of the gigantic palaces of the southwest, can from the high deck behold with delight the enchanting scenery the whole day long, and look with regret on the setting sun, which, gradually withdrawing behind the dark outline

of the cypress forest, leaves this lovely country reposing under the dark mantle of night. Not less beautiful and well cultivated are the shores of the great bayous and tributaries crossing the State in all directions. I invariably met with that far-famed hospitable welcome peculiarly characteristic of the southern gentleman and planter.

I consider it my duty to mention, especially as such, Mr. Theodore Packwood, Mr. Benjamin, Mr. McMaster, and Colonel Maunsel White, senator from Plaquemine. At the plantation of this last gentleman I was seized with a violent fever. Owing to the kind attentions I received I was in a few days sufficiently restored to enable me to examine his beautiful estate, on which utility and taste are everywhere blended. His large and, in fact, splendid sugar-house, placed in the midst of extensive cane fields, vies in neatness with any in the State. His superior draining machine, large canals, and innumerable ditches, deserve the highest praise ass also his garden, adorned with a great variety of roses, all then in bloom, with sweet myrtle, orange, plantain, oleander, aloe, and many other tropical shrubs and plants, as well as with live oak and other native forest trees, the intermingling of which is novel and curious for those born in the north. This valuable plantation extends a considerable distance up and down the coast, enclosed by a neat fence, lined with the hardy sour orange, its golden fruit adding to its picturesque appearance. To these gentlemen and their families I shall always feel most highly indebted; and, indeed, to every gentleman I called on, since they all gave me, with most condescending kindness, every information I desired, favoring me with the perusal of their memorandum books, and extracts therefrom.

The sources from which I drew my information were various, but I stand principally indebted to Mr. Theodore Packwood, of Scarsdale, to Mr. Benjamin, of Bellechasse, to Colonel White, Deer Range, Messrs. Morgan, and Wilkinson, and Urquhart.

I found also a great deal of valuable matter in Professor De Bow's Commercial Review, a work of sterling merit, containing a rich source of information for those interested in the statistics of our extensive country.

Mr. De Bow most obligingly tendered me the free use of his office and library, and I have availed myself of his kind, disinterested, and occasional assistance.

I have made copious quotations from the notices on sugar, furnished to him by the ablest planters. I feel myself excusable for having done so, as Mr. De Bow's work is new and scarcely known among those who live at a distance from the Mississippi.

I would strongly recommend every one interested in sugar growing, to peruse the Commercial Review, in order to keep pace with the progress of the Louisiana planter, who seeks information not only in his own country, but also in the West Indies and in Europe, the summer months being spent by him in journeying through these countries, and on his return in the fall he makes use of what he has acquired in his travels, attending to his business with a care

and interest that surprises even our active business men of the north. Such is the Louisiana planter, so far as I have had an opportunity of becoming acquainted with him.

There remains still much to be done. But the desire of improvement is aroused, the proofs of successful endeavors attained by some, must have convinced the less energetic, and there is no doubt, in a short time, the progress in the culture and the manufacture of sugar, will be rapid and general throughout the State of Louisiana.

A book which ought to be in the hands of every one engaged in the manufacture of sugar, is Professor McCulloh's able report in relation to the chemical nature of saccharine substances, and the art of manufacturing sugar, published by Congress in 1847. It contains all the valuable improvements up to that period, that had been made in this branch of industry.

I must crave some indulgence, as I had only a few weeks to visit the principal plantations, collect notes, and make drawings, but I hope that during another grinding season, I shall be able to complete a fuller report.

Through the disinterested kindness of Professor Corda, from Prague, in Bohemia, well known through his works upon vegetable physiology, and his numerous microscopic analyses, whom I met in New Orleans, in his scientific tour through the United States, I am enabled to lay before you beautiful and almost invaluable drawings representing the cane as seen, highly magnified; with a description of its structure, both of which will be found in their proper places.

Baron Von Humboldt most earnestly recommends Professor Corda to the American nation in a general letter of introduction, a copy of which I here annex, to show the interest this eminent savant yet takes, in his advanced age, in the progress of science.

I have also, with your permission, compiled from the records of the Patent Office, improvements patented in the manufacture of sugar, with illustrations.

It is highly important that the planter should be acquainted with the various improvements made in this branch of industry, in order to avail himself of them when found useful.

The publications of extracts from the scientific journals of England, France, and Germany, on this subject, in the official report of the Patent Office, would also be of great importance to the sugar growing interest, a branch of agriculture and industry which every year becomes more extensive, and in which many millions of dollars are invested.

I am, sir, with great respect, your obedient servant,

CH. L. FLEISCHMANN.

POTSDAM, *a* 10 *October*, 1848.

Dans la douce confiance que mes travaux sur l'Amerique et mon nom juissent encore de quelque faveur dans les belles regions, que M. Corda se propose de visiter, je m'empresse de lui offrir, le temoignage de la haute estime que ses favcrites publications de botanique et de geologie, son admirable talent d'artiste et son honorable caracter lui ont fait obtenir parmi nous. Je prends le plus vif interest dans le succes de ses voyages, et j'ose recommender M. Corda dont le zele et la sagacité sont connues en Allemagne, en Angleterre, et en France a toutes les personnes que par des conseils et leur affecteuse bienviellance peuvent lui ètre utiles.

A Sans Souci, pres de Potsdam,

ALEXANDER DE HUMBOLDT.

A 10 OCTOBER, 1848.

[Translation.]

NEW ORLEANS, *December* 21, 1848.

My short stay in New Orleans, and the entire want of bibliographic assistance, prevent me from fully meeting your flattering confidence in me, and furnishing you with a more perfect microscopic analysis of the sugar cane. Accept, therefore, the following small sketch on the structure of this so highly important plant, which interests me exceedingly, having been myself occupied for many years with the investigation of the best mode of cultivating the beet root, and the manufacture of sugar therefrom. (See the transactions of the Bohemian Trade Society.) I am really sorry that I am not able to give that full satisfaction which you and I would have desired.

I am respectfully yours,

CORDA.

CHARLES L. FLEISCHMANN, Esq.,
New Orleans.

Analysis of the Sugar Cane.

The stalks of graminaceae, or grass tribes, have only two distinct forms in their structure, vi: (*a*) such as have hollow stalks, in which the fibrous structure or woody portion forms a more or less regular or irregular circle; (*b*) those in which the whole inside of the stalk is filled up with the fibrous structure, forming a compact mass or marrow. To this class belongs the sugar cane. The following phytotomic analysis is rather superficial, yet sufficiently explicit for this object.

The stem, in all the various species of the sugar cane, forms

a more or less regular shaped cylinder, which is divided by nodes and internodes; forming, from the middle of the stem downwards to the root, and upwards to the terminal bud, several joints of various lengths; which are, however, in their anatomical structure, all alike—even in the lowest part that reaches down in the ground, where the joints are shorter and provided with roots, which branch out horizontally therefrom. (See figure 29*a*.)

The stem consists of three distinct parts.

The nodes (figure 6, *d* to *e*) are formed by a terminal and side bud, having a projecting rim, with a slight spiral turn, forming a ring around the stem upon which the leaves expand. When the cane ripens, the leaves drop off and exhibit a sharp edge projecting beyond the outside of the cane. Below this edge or ring the cane is covered from a quarter to one inch in length with a greyish waxy substance, called cerosie. Above the edge or ring are three or four rows of delicate points, placed between slightly curved ribs; these are the germinal points, and of great importance in the culture of the sugar cane, as on their perfection depends the reproduction of the cane. On the side of the last named points are situated the leaf buds or eyes, from which the young plant sprouts. These eyes are covered and protected during the period of the vegetation of the cane by the sheathing of the leaves. Each joint has a furrow, at the lower and deeper part of which the eye is placed. The internodes or joints form a more or less even cylinder, through the transparent surface of which can be seen the parallel layer of fibres. When such an internode is cut horizontally in two, and the surface of it examined with a magnifying glass, three distinct structures can be seen, viz: (figure 1) the bark, cortex, *a d;* the fibrous vascular tissue, *f g h;* and the marrow or cellular tissue, *c c*.

When we examine the bark through a still higher power, we find that its structure is composed of four different formations, viz: first, of a transparent, exceedingly thin, external layer, of no particular organic structure—see figure 5. Next to this is a row of thick-sided (pachytychous) cells, *b;* next to this layer are three or four rows of larger thick-sided cells, (bastzellen,) highly transparent, having in their sides a great number of pores. Immediately beneath that layer is a row of more or less oval shaped thin sided cells, (*d*,) which contain a green or other colored matter, of a globular shape, which the naturalist calls chromula, and which constitute the color of the cane.

When we examine the exterior layer of the bark in a longitudinal section of cane, (figure 4,) we observe that the pachytychous cells (figures 5 and 6) are of the shape of parallelograms. Figure 4 *t*, the thick sides, *s s* of which are provided with numerous pores. Between these, we find somewhat irregular oblong hollow spaces or pores, *r r*, called stomata, which form the organs by which the respiration system of the outer surface is performed. This is one of the most important acts in the functions of the vegetable life, because the plant, by means of them, partly absorbs from the soil or atmosphere the necessary elements to the formation of new matter. The fourth layer, constituting the bark, as above mentioned,

(figure 1, *a*, *b*, *c*, *d*,) forms a perfect circle, and covers the whole entire surface of the cane, having only three different kinds of openings, the largest of them leading from the fibrous part or marrow to the sides of the germinal bud. The second and smaller openings give egress to the woody fibres into the leaves, where they form the veins of the leaves. The third are the small openings on the interior surface of the sheathing of the leaf, through which the fibrous vascular bundles extend to the roots or germinal points. The whole interior of the cane, which is encircled by the bark, is filled up with two different kinds of structure, consisting of large cells of a delicate white tissue, (figures 1, 2 and 3, *e*, *e*, *e*,) which is called marrow. When examined in the horizontal section, we find another structure, consisting of small round bundles of tough vessels, extending over and through the whole marrowy substance. These vessels or woody tissue are next to the bark—not compact, as in the middle of the stem—and distinguish themselves in their structure from all other vessels in the sugar cane.

Each bundle consists of three different organs: 1st. Respiration vessels; 2d. Sap vessels; 3d. Fibrous or bastzellen. The first two organs are perfectly surrounded and protected by the latter. They originate under the surface of the inside of the leaf sheathing, on the root part of the stem, from one of the little rootbuds, and run upwards through a number of internodes, and tend gradually toward the centre of the stem, until they have reached the centre, where they run in slightly curved arcs upwards and outwards again to the sheathing, and then in a spiral line to the surface of the leaves, forming the leaf nerves, and by several series of such structure constituting the leaf. When we examine the fibrous tissue of a longitudinal section of a well macerated or rotten cane, from which the bark has been carefully removed, it will be seen that it forms a completely interwoven network, which covers the whole stem in more or less parallel layers.

We proceed now to the anatomical examination. When we examine a bundle of these woody fibres in its fullest development, (figure 1, section 2,) we find them, when looked at in a horizontal section, of a somewhat oval shape, the exterior layer of which is formed of woody or fibrous cells. Within are the organs of respiration, with large openings, *g*, *h*, and immediately over them are the sap vessels, *i*. But when we look at a bundle from the middle of the stem, (figure 2,) we find the same organs, in the same position, but with fibrous cells of less development. The fibrous cells (figure 2, *m*, *n*,) surround the whole bundle, and have several layers of a thick cellular tissue, which appear in the longitudinal section (figure 3, *m*, *n*,) as elongated cells, the sides of which are provided with very delicate pores; in the centre of these fibrous cells are two large tubes, (figures 2, and 3, *h*, *h*,) of cylindrical shape, the sides of which contain several of the spiral shaped pores, (figure 3, *n*.)

Between both of these large vessels are three or four smaller ones, (figure 2, *i*, *i*, *i*, *i*,) the sides of which are either porous, or consist of a single spiral thread, (figure 3, *i*, *k*.) Those which

have porous sides have, in their openings, (lumen,) very often, rings (figure 3, *p*, *p*) which serve to support the flabby sides, that bend between the rings a little inward, (see figure 3, *q*) which shows that the vessels or fibrous bundles of the cane are built exactly as in the whole group of monocotyledons.

The marrow, (figures 1, 2, 3, *e*, *e*, *e*,) which fills up all the space between the bark and fibrous bundle, consists of large transparent tissue, the single cells of which are of a dodecahedral shape, and consequently always appear in the transverse section hexagonal. Each cell consists of two different bodies, viz: (*a*) the cytoblast, or cell-nut, from which each separate cell obtains its origin. This is a spheroidal globule, (figure 3, *o*, *o*,) which appears, generally, attached to one of the sides of a cell, and is perfectly transparent. It contains in its middle a still smaller transparent globule, which is the proper cell-nut, and dissolves more or less when the plant reaches its proper development, or maturity, (*b*.) The cells (figures 3, 4, *c*, *e*) are formed of very transparent layers, which are perforated by a great number of very minute pores. Each pore of one cell corresponds with that of an adjacent cell. Through these pores the exosmose* and endomose† of the cell juice from one cell to another, takes place, and fills the whole cane. It is this juice which contains the sugar in solution, with a mixture of salts, albumen, gluten, &c. A perfect analysis of the sugar cane by the hands of an able chemist, made under the direction of naturalists, would lead to important results.

CULTIVATION, &c., OF SUGAR CANE.

Varieties of cane cultivated in Louisiana.—The planters of Louisiana cultivate five different kinds of cane; the Bourbon, the green ribbon, the red ribbon, the Otaheite, and the Creole cane.

The *Bourbon cane*, as represented in fig. 6, is very extensively cultivated. I found it almost the only kind of cane raised on some plantations; it has a good coating of silica, which forms a strong protection against the cold; the dark purple color of its cortex increases the absorption of light, and accelerates its maturity. It is thought a hardy cane, rattoons well, and yields good sugar; it has large eyes, (see figs. 7 and 8,) which resemble those of the red ribbon, and somewhat the eye of the Creole, (see figs. 13 and 19,) and withstands the influence of a slight frost.

I was told by a planter that, when red ribbon cane is planted in new rich land, it loses its stripes and becomes altogether purple; but that, when the same cane is planted in old dry land, the ribbon appears again. Others think that, when the eyes of the red ribbon cane are situated upon the purple stripe, the cane produced from such eyes is an entirely purple cane. The leaves, and the whole appearance of the plant, resembles that of the red ribbon represented in fig. 22.

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* Exosmose.—That force which causes a viscid fluid lying on the outside of an organic membrane to attract watery fluid through it.—*Elements of Botany, &c., John Lindley.*

† Endomose.—That force which causes a viscid fluid lying within a cavity to attract to itself a watery fluid through an organic membrane.—*Ibid.*

The *green ribbon* (fig. 9) is undoubtedly a different species of cane, not only from its light yellow color and delicate green stripes—whence its name is derived—but also from the difference of shape and formation of the eye, (see figs. 10 and 11,) which is small, elongated, and delicate in its structure, resembling that of the Otaheite, (see figs. 16 and 17.) The cortex is less strong than that of the Bourbon, it yields well, but is much more easily affected by frost than the former.

Next to the Bourbon, the red ribbon (fig. 12) is the most extensively cultivated in Louisiana. It is a beautiful cane, and its purple stripes vary from one inch to a line in width. Like the Bourbon, it has a strong coating of silica, which makes it more hardy and capable of resisting slight frost. Its eyes (see figs. 13 and 14) are in shape and size like those of the Bourbon, and are less affected by the inclemency of the weather than the green ribbon, Otaheite, or Creole cane. It rattoons well, yields well, and the juice from the ripe cane is rich sugar.

The Otaheite cane (see fig. 15) has large joints, but grows less high, and its cortex is less thick, than in the former species; its eyes (figs. 16 and 17) are of a very delicate structure; this cane does not rattoon well, which must be ascribed to its delicate eyes. It is easily affected by the frost, in consequence of which very little of this kind of cane is cultivated, although its juice is rich and yields very abundantly.

The Creole cane (fig. 18) has, in former years, been very extensively cultivated in Louisiana; but the Bourbon and red ribbon, from their hardy nature, have nearly every where superceded it. It is only planted in small patches for eating; and in the neighborhood of the city of New Orleans, it is raised for the markets. Its cortex is easily crushed, and yields a very rich and delicious juice, from which a superior kind of sugar is produced. Its eyes (figs. 19 and 20) are rather small, but still of a larger size than those of the green ribbon or Otaheite, and resemble somewhat those of the Bourbon and red ribbon. I have been informed that, in the parish of Plaquemines, the planters begin to cultivate it again more extensively. I have seen there, on Mr. Morgan's plantation, who always cultivated it, considerably large fields planted in that cane. This cane grows short, its leaves are straight, (see fig. 23,) and do not droop like those of the Bourbon or red ribbon.

The joints of this cane, like that of the Otaheite, are often covered with a black matter, which comes off when rubbed, and appears to be a kind of fungus.

Among the Bourbon and red ribbon cane, there grows sometimes a large cane of whitish color, with very large joints, containing a great deal of juice, but of a disagreeable taste. This is a diseased cane, caused by long wet spells; its whole appearance is coarse and unnatural, something like the diseased limb of a man. Colonel White planted that cane in his garden, and remarks, in his memorandum, kindly extended to me, "I also took the white, sickly looking cane, frequently found among the purple and red

ribbon, the bark of which is softer, and the cane itself more juicy. It grew well and large, and, from having air and sun, produced a yellowish, slightly purple, looking cane, which I continued to plant until I got about five acres. I then abandoned it as worthless."

I have been told of different varieties of cane produced, by planting ribbon and Otaheite cane in the same field; but, as the cane never flowers, how could it be possible to produce a different variety?

The length of the ripe joints vary; those of the Bourbon and red ribbon have joints varying from four to nine inches in length. The cane cut for grinding measures from three to five feet in length. I saw some over eight feet high, and with from twenty-four to twenty-eight good joints; but they are a rare instance. The eyes are situated above the joints, and alternate in a straight line on each side of the cane. The knots, or ring, of the joints are of a light yellow color, and have two or three rows of minute points, from which the roots project; below the joint the cane is surrounded with a ring of greyish substance, which Mr. Avequin analysed, and found it to be a substance similar to wax, and called it, from this resemblance, *cerosie*.

This film of wax-like substance covers the whole length of the joint. I observed it to be abundant on the Bourbon and ribbon cane. Mr. Avequin states, that cane which is much covered with this kind of wax yields little sugar, while those species of cane which have little of that waxy coating are richer in sugar. Mr. Avequin presented me with two specimens of the cerosie. It is a substance, in appearance and touch, very much like wax of a dirty greenish color, exceedingly brittle, requires a higher degree of temperature to melt it than sperm, tallow, or beeswax, and when melted together with them, it separates from them in cooling.

Mr. Avequin showed me some cane arrows which he had brought with him from the West Indies; they were cut from the last joint of the cane and measured from five to seven feet in length, the cane itself being about six to eight feet high. The spike is about one and a half foot long, bearing very small delicate grains; the glumes are provided with a fine silk-like plume, to facilitate the winds to carry the seeds of this useful plant great distances, showing that nature has intended it should propagate from the seed; still there exist a great diversity of opinion with regard to the power of reproduction through the seeds of cane.

The spike is composed of a great number of delicate branches, as represented in figure 24, drawn from nature, full size, and upon which the delicate glumes and seeds are placed, as shown in figure 20, representing a single seed with its feathered glumes, full size.

Even in the West Indies, where the climate is so favorable to the growth of cane, it arrows very sparingly. Mr. Avequin told me that he there saw in a whole field sometimes only few plants with arrows, and that the seed from the cane never sprouts; he collected great quantities of their delicate seeds, analysed them and

found them to contain all the constituent parts of seed belonging to the graminaceous tribe.

Wray remarks in his work, "The Practical Sugar Planter," page 30: "As I have often been applied to on the subject, and have instituted many inquiries and experiments, in order to satisfy myself and others, I take this opportunity of stating what I have ascertained on the point.

"*First.* That no variety of sugar cane is known to perfect its seed, (or indeed, to produce anything like seed,) either in India, China, the Straits of Malacca, Egypt, or even in the South Sea Islands; as in all those countries the cane is entirely propagated by cuttings.

"*Second.* I have, myself, tried numerous methods, which I imagined might, by some possibility, cause the plant to perfect seed. That many of these were fanciful, and perhaps, far-fetched, I have no hesitation in owning: under these circumstances, there is no need to make them public, or weary the reader with a long detail."

Time of planting.—The planting time of the cane in Louisiana, is in the fall, and immediately after the grinding is over. Few planters commence planting as early as October, but few have time to begin planting before or during the grinding season.

They are fully occupied at that period, laying up their seed-cane, and in making all the necessary preparations for grinding and boiling.

Cane planted in the fall, gives generally a fine crop, but it requires well drained fields, for if the ground be wet and the weather mild, the cane will rot; furthermore, it must be well covered with earth, at least to the height of four to six inches, to protect it from the frost, in case of a severe winter. Cane well planted in dry land, comes up early in the commencement of the warm season, and outgrows cane planted early in the spring; for this has to contend against wet or dry weather.

Distance of planting cane.—There exists a great difference of opinion among the Louisiana planters, with regard to the distance that cane should be planted apart. Many still adhere to the old mode of planting, that is, in rows from three to five feet, while others plant it, with great advantage, eight feet apart, or at such distance, that the carts and cattle straddle the rows in carting cane from the field, without injury to the rattoon.

As in Louisiana, the cane must reach its full growth in nine months, the planter carefully endeavors to expose it as much as possible to the influence of the sun and free circulation of the heated air.

I have seen cane planted at eight feet, which was so luxuriant in its growth, that the rays of the sun could scarcely penetrate, although it was a field planted with cane for twenty successive years, and had only the year previous a crop of Indian corn and peas on it; that one year's rest, wide planting, and proper culture, gave it such a vigorous growth, as I never saw in any agricultural produce.

I made a sketch of it, as seen in fig. 29, to give those who never saw a cane field, an idea of the luxuriant growth of this beautiful and graceful plant.

I think some of the Louisiana planters look too much to the number of acres planted in cane, and not enough to a more perfect culture, whereby they would increase the size of the cane, and improve the quality and add to the quantity of the sugar.

Seed cane.—The Louisiana planters use generally for cane seed, the riper part of the stalk. Some cut the cane in the middle to use the tops for planting, and bring the lower joints to the mill, some again, use the green tops alone for planting.

It is with cane as with all other plants, imperfect seed produces a poor plant and bad fruit. The planter cannot expect that seed-cane, with delicate imperfect eyes, short thin joints, will produce a cane like one of vigorous growth, with perfectly well developed eyes and a great deal of juice which supports the young shoot, until its roots are strong enough to obtain nourishment from the soil.

The young sprout from poor cane is less able to support the inclemency of the climate and is more liable to disease.

In the West Indies, we are told, the few upper joints of the plant nearest the leaves, commonly designated as the "cane tops," are used for cane seed. In the West Indies, where the cane arrives to perfect maturity, where every joint is ripe, and every eye well developed, the top joints may answer, but in Louisiana, where the cane is never entirely matured, where it must be cut before the upper joints are formed, the tops are not fit for seed, and the result must necessarily be a bad one. All the planting of cane that I have seen, was done with cane from five to twelve joints or more in length.

Some planters select for seed the oldest or poorest rattoon cane; this cane is of small growth, has a few short joints, and bad eyes, and appears almost to be a different species of cane from the plant cane which has been raised upon well prepared and thorough drained soil, or after Indian corn or peas. These planters save all their fine cane for the mill, and forget that by this kind of economy they reduce their crop for the following year, and that it will affect the sugar, both in quantity and quality.

"I cannot believe," says the writer of that able article on sugar, in De Bow's Review*, "that this practice of always selecting the poorest plant cane for seed, was one of the main reasons which caused that fine variety of cane called *creole*, to degenerate to such an extent, that in late years it has been almost entirely banished from our fields."

Mode of planting.—Previous to planting, the land is ploughed, well harrowed, and the rows marked with a two horse plough, after which the double moulded plough follows, which opens a clear furrow ready for planting.

In this furrow three canes are laid straight, in rows four inches apart, (see fig. 26.) If we examine the drawing of the various species of cane, we shall observe that near every joint is an eye which is always opposite to the eye of the next joint above or

* See De Bow's Review, Vol. II., p. 324.

below, so that in every cane there are two rows of eyes in regular order and in a straight line.

It is, therefore, very important in planting to lay the cane in such manner in the furrow as represented in figure 27, that both rows of eyes be free to grow their young shoots at the same time. This mode of planting cane requires attention and much labor, because the cane must be refixed sometimes with earth to keep it in its proper position, to prevent its turning when the earth is thrown upon it, and few planters have hands enough to spare them for extra labor, just at that time. In case the cane is thrown promiscuously in the furrow, and some of the cuttings have to lay with one row of eyes facing the ground, as represented in figure 28, the young shoots will have to twist and force their way up to the light, and their growth is necessarily retarded and unequal.

The cane, when thus laid in straight lines, three thick, two joints of the top, and two of the butt always brought together and overlapping, must be carefully covered with the hoe; the depth of the earth thrown over it varies according to the season; in the fall, as mentioned above, it requires from four to six inches, according to a more southern or northern latitude of the sugar region. For cane planted in the spring, two inches of well pulverized soil is sufficient, in order to hasten the development of the shoots, and accelerate the growth of the cane, that it may reach its maturity before the cold season sets in. In the tropical region the planter has nothing to fear from frost, and he gives his cane as much time as it naturally requires to come to maturity.

The Louisiana planter labors under great disadvantage in this respect, and his principal aim must be to obtain fine large canes in as short a period as possible; and this depends not only on early planting, but also on a careful preparation of the soil, good seed cane, and proper cultivation during its vegetation.

On Manure.—The Mississippi valley, and especially the lower portion, which embraces the State of Louisiana, has been the depository of enormous beds of fertile soil since time immemorial, composed of the minutest particles of organic and inorganic matter, brought together down from the source of that father of rivers, rolling its muddy waters over various rocky beds, washing the extensive limestone, coal and chalk formations in its current southward, mixing with it in its course vegetable as well as animal matter, and adding thereto the deposites of its numerous tributaries, which have their sources among the primitive masses. The rapid current rolls on for thousands of miles, and deposites gradually its more bulky and heavy particles as it winds its way down to the lower portion of that valley, where its bed becomes deep and its current more gentle, forming on either side of its channel the inexhaustible treasures it holds in suspension.

Although the formation be the same, yet the soil differs in its nature, even on the same plantation. Generally speaking, we find the soil near the banks of the river of a more sandy character; it is there more elevated, and slopes gradually as it recedes from the

river to wet flats covered with cypress, magnolia, palmetto, and the slender cane or grass, forming vast prairies. Between these marshy flats and the river the land is in general cultivated and planted in sugar cane.

Formerly, and previous to the shores of the Mississippi being cultivated, the river overflowed every year at several times its banks, the water spreading over those immense flats, and depositing nearer the bank the heavier sandy particles, and gradually as it reached the more level portion strewed on it inexhaustible layers of fertile soil. Then, where the water could not entirely drain off after the river had subsided again, the rank prairie grass, the moss clad cypress, and many fingered palmetto, vegetated, decayed, and thus for centuries accumulated their vegetable remains, on which a most vigorous vegetation continues yet, yearly, to add a fresh supply of vegetable matter.

The planters protect their land against this inundation by an embankment, which varies in height and width according as the river is wont to rise at certain places; these *levees*, as they are called, are thrown up on both sides of the river, and answer well the purpose of keeping the water within its channel. Sometimes the river carries away a portion of land on one side and takes it to some other place; when this happens the levee must be renewed. However, some plantations are entirely free from that danger, and a little attention to the repairs of the levees is all that is required to keep this majestic stream within its bed.

The soil along the Mississippi is sandy; after that comes a stiff, tenacious, dark soil, highly fertile, but difficult to work, on account of its retentive powers; then begins the vegetable mould, bedded upon turf or quick sand—the deposites vary, and few plantations are alike in that respect.

The elevated portion of those bottoms along the banks of the river has been under cultivation for a series of years, and gradually, as the culture of the sugar cane is extended, the forests recede from the shores to make room for the cane; more especially since large canals, ditches, and efficacious draining machines have freed the lower ground of the stagnant water, leading them to lagoons or bayous, which empty their surplus into the gulf of Mexico.

It would surprise many a northern farmer to see the quantity of ditches, the lengths and widths of canals, which the planters are obliged to dig and keep in repair. They would be astonished to see the well-built scoop-wheels worked by powerful steam engines. Were these canals joined together, they would well deserve the name of a great national work of internal improvement. And the planters of Louisiana have undertaken that work without any assistance from the State.

When we examine the banks of the Mississippi river, and see one and the same kind of alluvial deposites to an enormous depth, or when we look at the black, rich soil thrown out from the ditches and canals which cross the plantations in all directions, and which is of the same nature as the soil upon which a luxuriant crop of cane thrives, we must acknowledge that the Louisiana planter is right

in saying: "Our lands are inexhaustible; they require no manure; we have only to plough deeper to bring up a new supply of virgin soil, and we can raise for years to come heavy crops of cane." Yet, nevertheless, the planters find it a very great improvement to plough in the tops and other trash gathered from the cane; they find it even necessary to put their cane land now and then in Indian corn and peas, to be turned under with the plough, as they have discovered that cane planted without intermission in the same fields yields badly, and that after this kind of vegetable manure, the cane succeeds better, yields more, and gives sugar of a superior quality.

The writer of the already quoted article, in De Bow's Review, Mr. Benjamin, says:

"When the cane is cut in the fall, a large portion of the produce of the soil remains on the field, as is well known, in the tops and leaves of the cane, the ripe portion alone of the stalk being conveyed to the mill. This is called the trash, and is placed on the stubble to assist in protecting from the frost that part of the cane which remains under ground, and from which the rattoons shoot up the ensuing season. As soon in the spring as danger of frost is no longer apprehended, the trash is raked off the rows of stubble to allow access to the sun and air; and on nearly all plantations this trash, which is a useful and fertilizing manure, is burnt up, instead of being returned to the earth. One cause of the difficulty of making use of this trash as manure, was the narrowness of the space between the rows under the old system of planting, which left so little room as to make the operation of ploughing in the trash difficult and laborious; but where the rows are eight feet apart, the task is easy. Independently of the considerations to which I shall presently advert, and which derive their force from the chemical constitution of the cane, it is difficult for a person who has not witnessed the results to form an adequate idea of the improvement to a soil that is naturally at all stiff or clayey, from the mere mechanical subdivision of its particles attendant on the decay of the large quantity of this trash left annually in the fields. This system was first put into operation last year on the plantation of which I am part owner. The trash on the first ploughing of the rattoons was covered with the earth turned over from the furrow, which is run alongside of the stubble. At the second ploughing, when it became necessary to turn up the entire space between the rows, the difference in the soil was so perceptible as to create strife amongst the negroes for the preference of ploughing these rows, the subdivision of the soil caused by the decay of the trash rendering the work much lighter and easier than in others, where, from causes not worth detailing, we had been compelled to burn this trash. The advantages of this system are such, that in lands which have been thus treated for a term of ten years without repose, I have been assured that the soil, far from deteriorating, is perceptibly improved in each successive year. The space between the rows not only reposes for three years, but is enriched by an annual increment of the best manure,

and when it becomes necessary to re-plant, the cane is planted in the spaces thus fertilized, and the former rows then become intervening spaces to receive in their turn the benefits of this rich nutriment for the soil.

I referred in support of the advantages derived from the plan of ploughing in the trash, to the chemical constitution of the cane, as established by organic analysis. Although I am satisfied, from reasons which I will give when I come to treat of the manufacture of sugar, that no accurate or satisfactory analysis of the sugar cane has yet been made, or at least published, still the errors are not such as to affect the results in relation to cultivation.

Sugar cane is composed of water, woody fibre, and soluble matter or sugar. In round numbers, it may be stated that the proportions are 72 per cent. of water, 10 per cent. of woody fibre, and 13 per cent. of sugar. But sugar itself is shown by organic analysis to consist entirely of carbon and water, and woody fibre consists principally of the same elements combined with inorganic bases, so that the oxygen and hydrogen found in the sugar cane in the state of water, or as constituent elements of the sugar, and woody fibre, form about nine-tenths of its weight, and are entirely derived from the atmosphere and from water, thus abstracting nothing from the soil. But this is not all; vegetable physiologists agree that a very large proportion of the carbon of plants is derived from the air through the action of the leaves, which decomposes the carbonic acid of the atmosphere, and appropriates to the formation of the tissues of the plant, the carbon contained in the acid. For the purposes of the present illustration, it may, therefore, be assumed that not more than about six per cent. of the growth of the cane is derived from the soil, and hence the fact, that this crop can be cultivated on the same soil without exhausting it, for a long series of years; but it is certain that a system which is constantly abstracting *something* from the earth, and never making to it any return, must by degrees impair and eventually destroy the fertility of even the alluvial soil of Lower Louisiana. Now, by ploughing into the land each year the tops and leaves stripped from the stalks, not only is the soil improved by the mechanical sub-division of its particles above referred to, but it is kept in good tilth by having restored to it not only, at least, as much carbon as was abstracted from it, (because the tops and leaves contain fully as much of the carbon derived from the air, as the stalks contained of the carbon derived from the soil,) but a large portion of the inorganic bases. And if to this, the bagasse were added as a manure, we should never hear of a soil being worn out on a sugar plantation in Louisiana. I am aware that it was formerly doubted whether any of the carbon of plants was derived from the soil, but later researches have put this point at rest, and have shown that a large portion of this element is derived by plants from the carbonic acid evolved from vegetable substances during their decay in the soil, either by its inhalation into the roots in an aeriform state, or by its first entering into solution into the water found in the soil, and being afterwards absorbed

in this form by the roots. The experiments of Sir Humphrey Davy on this point appear conclusive; that eminent chemist having shown that "different plants and grasses grow much more luxuriantly when watered with solutions of sugar, than with common water; the two liquids differing in nothing but the presence of carbon in the former, and its absence in the latter."

This shows that even the "*inexhaustible*" alluvial beds of the Mississippi become fatigued from continual cropping of one and the same kind of plants, and a year's change of crop, with a supply of vegetable manure, gives it new strength to produce afterwards a fine cane crop.

It is, then, the change of crop and manure which is indispensable, even in Louisiana, to till the soil with advantage. I must say that I was surprised to see the banks lined with bagasse to prevent them from caving in; still more was I surprised to see it carried to a field not far from the sugar-house and set on fire, where it is partly burned, and the ashes being washed away by the heavy rains. Yet that same bagasse would make an excellent compost, if properly prepared, and mixed with earth thrown out from the ditches, stable manure, ashes from the steam engine and kettles, the scum from the defecators and kettles, and animal charcoal from filters.

Bagasse, when piled up without the admixture of other materials and water, remains undecomposed for years; as I have seen on the banks of the river whole piles, in almost a preserved state, which have been there for years. But when prepared in the following manner, it will make an excellent manure. For instance: I would place the compost heap near to one of the main ditches, to obtain the necessary water to moisten it; the first layer of the compost heap should be made of bagasse, say 25 to 30 feet wide, and 100 feet long; upon this a layer of earth should be carted, or thrown, in case it has already been carted, before the grinding season; then another layer of bagasse, and another layer of earth. The layer of bagasse over the last layer of earth is to be covered with stable manure, and upon this alternate layers of bagasse, earth, bagasse, manure, and so on, until the heap is about 12 feet high; then cover it over with earth, and begin a new one. These heaps must, soon after they are made, be thoroughly soaked with water, which can be taken from the ditch by means of a pump. The watering must be repeated several times during a dry spell, until the heaps show, upon examination, that the bagasse is decomposed, which should probably be about the middle of the following summer or fall, when it may then be carted into the fields to be ploughed in, preparatory to planting.

The objection which will be raised that it would require several teams of mules to cart manure and earth upon the bagasse, and hands to load and spread it, at a period when every hand must be employed to cut cane, cart and grind it, I admit as weighty. But why could not the bagasse be carted to a proper place where the compost heaps might be advantageously located, and there left until the grinding season being over, the compost heaps might then be attended to?

Shells, lime, and coal dust would be good addition to the compost. The carting in the field could be done at the most convenient times before the grinding season; and the advantages derived from it would surpass green-soiling with peas, and the effect of the manure would show itself for at least three years.

This kind of manure would act chemically as well as mechanically; it would loosen the tenacious soil and give access to the atmospheric air, and the roots of the cane could extend themselves in the ground with more ease.

I would rather see the bagasse used as fuel than to see it wasted in the manner it is now, for then the ashes might be collected and applied to the soil.

Wray, in his valuable work on sugar, mentions the application of green trash from the mill as powerful manure, page 75.

"The green trash, *direct* from the mill, is returned to the trenches of the field from which the canes are just cut, by very light carts, and thrown carefully over the dry leaves and long tops lying in the trenches between the banks."

"The levelling machine, drawn by six cattle, is introduced between the banks, which powerfully presses down the mass of trash, &c., and at the same time slices off, from either bank, some four, six or more inches of earth, and arranges it cleverly over the trash. This repeated once or twice, as may be determined on, quite covers over the trash, and leaves the smallest possible amount of work for the laborers, which consists in their cutting, with very sharp hoes, the cane roots down to the bottom, and levelling the small portion of the bank remaining, so as to have the whole field once again quite level. In a few days after being so cut down, the stools begin to throw up numerous vigorous shoots or sprouts, which soon require a light moulding."

And p. 279, he describes the levelling machine as follows:

"I will now proceed to give a rough description of the construction and peculiar action of the levelling machine alluded to:

"This machine consists of an iron cylinder, somewhat similar to a garden roller, to the frame work of which are affixed two arms preceding the roller; these gather the cane trash and place it in a position to be pressed down by the roller, whilst immediately behind the roller are two cutters or ploughs, which slice off from either bank portions of earth, and by means of the mould boards arrange them cleverly over the cane-trough.

"Thus, in planting in lines six feet apart, the canes would receive, in banking, successive portions of earth, until the banks had become about three feet broad at the base, one and a quarter feet at the top, and two and a half feet high; the space then left between the base of the banks would therefore be only three feet, which accordingly is the breadth of the roller. Now, when a field of cane is cut, and the leaves and trash of all kinds are laid in the trenches, this machine being introduced between the banks and its cutters or ploughs properly adjusted, (by means of an expanding contrivance,) the roller passes over the mass of cane-trash, which it compresses, and the cutters or ploughs cut off from each bank the desired

quantity of earth which is made to fall over the trash so as to cover it up. In each succeeding trip the cutters are expanded in order to take off a further quantity from each bank, until they are so much reduced that but little is left to cut down by hoe."

"Thus the machine proceeds up one trench and down the next alternately until the field is finished, altering the expanding apparatus each time to suit the case. It is necessary for me to say, that I have never seen such a machine at work, but it is of my own contrivance, which I intended expressly for the work specified; and I have a very firm belief that it will be found to answer the ends proposed very well indeed; and if so, there can be no doubt as to the saving of time and expense it would effect in the work of an estate."

There must be a great deal of inert *humus* in the soil of Louisiana, from the very nature of its formation and wet condition, which the application of alkalies would render soluble, and thereby act beneficially towards the growth of the cane.

A proper analysis of the soil is much wanted, to show how much organic matter it contains, and consequently how much ashes or lime would be required to render it more productive. A judicious application of lime would undoubtedly increase the productiveness of this soil. In the lower part of the State, where shells are plenty and wood in abundance, experiments, on a limited scale, upon different portions of a plantation, would soon show what effect calcareous matter produces.

Shells carted upon tenacious land and ploughed under would facilitate its cultivation, and render its drainage easier.

The atmospheric manuring—ploughing—is one of the most effective fertilizers of the soil. But when I speak of ploughing, I do not mean a mere scratching of the ground, half turned up in thin slices, a work denoting more the passage of a herd of swine than that of a proper implement drawn by four mules. For what can be the effect when the soil is worked and turned about for years at the same depth? It is natural to suppose that the rain will wash gradually all soluble particles down into the sub-soil, and carry it off in the ditches. The continual cultivation of the same kind of crop must deprive it gradually of those elements which are requisite for the perfect development of the plant, and by degrees it will cease to yield profitable crops.

I had once the stiff fertile clay land, which forms the granary of the upper portion of the Danube valley, ploughed in the fall with heavy four-horse ploughs as deep as the plough could be set, to bring up some of the sub-soil, and expose it to the influence of the weather. The following crop looked as if the field had been manured with the best kind of stable dung, so luxuriant and beautiful it grew.

The sub-soil plough has been introduced in Louisiana. I saw it on several plantations; but I suppose it has not as yet been very extensively used. There is not the slightest doubt that a good sub-soil ploughing, after a deep furrow has been thrown up with a heavy plough, would increase the productiveness of the alluvial

lands; for not only the sub-soil plough would loosen the sub-soil, but facilitate a deeper penetration of the roots;* but the air would rush immediately into the smallest openings and crevices, and there begin its chemical action. Besides, it has still another advantage, which would be that of furthering the drainage of the rain water, if care is taken that the water in the ditches be kept low.

Although the cane is a tropical plant, still, even in its native country, it requires rich land or manure and proper cultivation to be brought to perfection. Not being a native of Louisiana, which latitude is rather too high for it, it is only by a careful cultivation—which will accelerate its maturity in a short space of time, that it may be perfect before the frost sets in, and by a regular supply of fertilizing elements hasten its growth—that the cane may be raised successfully in the State.

The planters of the less fertile regions of Louisiana will be obliged to adopt regular rotations of crops, and to manure their fields at certain intervals, to keep their land in heart and produce a vigorous cane, which will pay the labor of cultivation by a rich yield of sugar.

MILLS.

The mills used for grinding the cane are generally placed ten to twelve feet from the ground, in order to give sufficient fall for the juice to flow into the juice boxes, and from them into the kettles.

The mills consist mostly of three iron rollers, from 25 to 28 inches in diameter, and from 4 to $5\frac{1}{2}$ feet long.

The thickness of the shell of the rollers, in those mills constructed by Leeds & Co., New Orleans, represented in figures 30 and 31, varies from $2\frac{1}{4}$ inches to 3 inches, according to size; the depth of the eye of the roller is 12 inches in all these mills. The shafts are of wrought iron. The journals vary in size from $7\frac{1}{2}$ to $8\frac{1}{2}$ inches in diameter. The boxes in which the journals revolve are of brass, lined with "Babbitt's anti-attrition metal." The return plats, about which there is a great difference of opinion respecting their proper position, are placed from one to two inches below the top roller. The cane carrier is from fifty to ninety feet in length, according to the height at which the mill is placed.

* "In digging post holes for a cow pen on a thrown up cane piece, I have found abundance of strong cane roots, running in all directions, in a stiff cold clay, two feet perpendicular below the surface. In transplanting some young cane, about six or eight weeks old, I pulled up some with roots fully three feet long; they must have been much longer, but the fine ends were broken off by being roughly pulled out of the ground. On mentioning the above circumstance to a friend of mine, he told me that, in confirmation of the circumstances, on one occasion when travelling he passed a part of a steep bank that had lately fallen, from wet weather, and that he could distinctly trace the cane roots ten feet deep. Of this, I do not entertain the smallest doubt, as it is quite in accordance with vegetable physiology." (See Eight Practical Treatises on the Cultivation of the Sugar Cane, Jamaica, 1843, p. 99.)

"But who would suppose, but he who knows the fact, that roots of cane, small and delicate in appearance, would penetrate three or four feet in the hardest soil we have. This I discovered many years ago, from a deep gully being worked through a cane field on the side of a hill on Belleisle." (See De Bow's Commercial Review.)

The roots of the Canada thistle have been followed down to the depth of seven feet; those of oats eighteen inches; those of onions in mellow black soil two feet; potatoes, fifteen and twenty inches.

The different sizes of sugar mills made by Leeds & Co., at New Orleans, are as follows:

With rollers	25	inches	in diameter,	4 feet long.....	$3,200
"	27	"	"	"	3,500
"	27	"	"	4 feet 6 in......	3,650
"	28	"	"	5 feet long.....	4,000
"	28	"	"	5 feet 6 in......	4,200

For the same sizes of mills placed on wood the cost will be about two hundred dollars less for each size of mill. The cost of erection will be about two hundred dollars of additional expense.

There are few cane mills with five rollers in Louisiana. Colonel M. White, of Deer Range, had one of them in use, and he says in his memorandum book: "After having fairly tested its usefulness, we rolled with all imaginable care for three hours and six minutes, and, while we got from the first three rollers 1,600 gallons of good juice, we only obtained about three gallons of a matter, more like soap than anything else I can compare it to."

Mr. Lapice, who uses a similar five roller mill, I understand, moistened the cane coming from the first set of rollers before it passes between the other set, and obtained good results from it.

Mr. Alfred Stillman, of New York, obtained letters patent, dated 8th of August, 1846, for a sugar mill, as represented in the sectional view, figure 32. A being the frame; B B′, the two beds; and C the top roller of the first set. E, the cane carrier; *a*, curved metallic plate; *c*, inclined plane; *d*, endless apron; and *e e′*, rollers; *f*, inclined shute; F and G, second set of rollers; *g*, the bagasse apron. Figure 33 represents a five roller mill, built by Nellius, in France, for the French colonies.

Wray, in his Practical Sugar Planter, page 297, describes a simlar five-roller mill, as represented in figure 32, and says: "The arrangement of the mill with its extra set of rollers, or crushing cylinders, is that which is commonly used in Provence, Wellesley, Mauritius, and Bourbon, with the exception, perhaps, of the band which travels between the first and second set of rollers. A few explanatory remarks may, however, be necessary to show its principle.

"The first set comprises the usual number of (three) rollers, one of which has a spur wheel that works into another wheel of similar size on the shaft of the second set of rollers, and communicates the motion which itself receives from the engine. Thus, the first set is acted on by the engine, and transmits that power to the second set by means of these spur wheels, so that both sets move on together at the same pace.

"The second set comprises only two rollers, which are situated from six to eight feet from the first set, and the expressed cane-stalks, as they issue from the first set, are carried on the second by means of an endless band which travels between the two sets. At this point an attendant is posted, to direct the passage of the cane-stalks, so that they may be presented to the rollers of the second

set in the most desirable manner. Perhaps the best material for the traveller band is brass, 4 inches; gauze not too fine.

"During the passage of the expressed stalks between the two sets, a jet of steam or moderately hot water may be applied to them, if considered desirable; of the two, I should prefer water as hot as the feeder could bear his hands in.

* * * "The intended benefit of this application of hot water is twofold, viz: first, in saturating the already expressed cane-stalks, in order to obtain from them, during their passage through the second set of rollers, whatever saccharine matter may be still remaining in them; and, secondly, in cleansing and keeping perfectly sweet the traveller band. * * *

"An engine and mill such as represented and described,* will grind canes sufficient to yield upwards of 12,000 gallons of juice during the day of from twelve to fourteen hours, besides allowing of the engine performing such work as may be required by the vacuum pan, or Wetzall's concentrators.

"The mills, such as I have represented, obtain, commonly, 70 per cent. of juice, and have been known, when they were carefully adjusted, to yield 75 per cent."

In the late publication entitled "On sugar cultivation in Louisiana, Cuba, &c., London, 1848," the author, speaking of mills, says, page 25:

"In 1844, passing through the Havana on my way to the neighborhood of Matanzas, I called on my friend, Don Wanceslao, to inquire after his apparatus of the double pressure system, working since the beginning of the crop; he told me that by an experience of four working months, he has arrived at this conclusive result:

"1st. That the second mill crushed the bagasse so much as to render it unfit to be used as fuel.

"2d. That owing to the ruptured squeezed cane, minute parts of the cane mix with the cane juice, rendering its clarification very difficult, and producing a very inferior sugar.

"In reaching la Mella, I was convinced Don Wanceslao was right this time. Two of the four twenty-five horse steam boilers were fed with wood, a fuel very expensive in this part of Cuba, and the sugar was far from good. The year before, these four boilers were heated by the bagasse alone. What, then, is to be thought of the sugar mills with four, five, and six rollers, patented in France and England?"

It is not mentioned that Don Wanceslao used either steam or warm water for moistening the cane before it passed between the second set of rollers. The mixture of particles of the cane with the juice, can be no serious consequence where the juice passes through properly constructed strainers and animal charcoal filters before boiling. The greater consumption of fuel, which is caused through the increase of power for grinding and evaporation of the

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* The rollers are described as having four feet in length, and two feet diameter.

additional 28 per cent. of juice, must be amply repaid by the greater amount of sugar produced.

Fig. 33 represents a five roller sugar mill, built by Nellius, in France, for the French colonies.

Messrs. J. P. Morris & Co., of Philadelphia, constructed a four roller mill for the Battle ground sugar refinery near New Orleans, owned by L. Janin, esq.; its cost was $5,600. Fig. 34 is a representation of that mill.

There are several other foundries in the United States where mills for grinding the sugar cane are constructed.

Planters who pay attention to the setting of the rollers and the feeding of the cane carrier, obtain 66 per cent. of juice; yet the usual amount obtained, probably, does not exceed 52 per cent. Wray recommends "the first under roller to be adjusted exactly five-sixteenths of an inch from the main or upper roller, and the second under roller just one-tenth of an inch from the upper roller."

I found the bagasse coming from mills with a slow speed, always more perfectly expressed than from such with more rapid motion. The velocity of the mills I had an opportunity to observe varied from $2\frac{1}{2}$ to 4 revolutions per minute.

Cane carrier.—The cane carrier consists of an endless belt formed of chains with slats inserted into it, placed in an inclined position of about 30° to 35° to the ground.

The best constructed carrier I saw was at Mr. Th. Morgan's plantation; it extends considerably beyond the mill-house, and is about two feet from the ground, at its lower end, a height which enables even children to throw and spread the cane properly upon it, without much exertion. The carriers I have seen elsewhere, I think, are too high, and render necessary the use of a feeding table, attended by two hands, to shift the cane from it to the carrier, an extra labor which might be spared.

It is very important that the carrier should always be well and evenly supplied with cane, for if thrown carelessly on it, they reach the rollers promiscuously, and enter between them, sometimes several at one place, overlapping each other, and often the carrier runs for some time empty, causing by this irregularity, checks, jerks, and strains, in the motion of the power to force them through, the journals below get heated, and what is worse, the cane being indifferently pressed, causes great loss of juice.

The carrier ought to be established under a shed large enough to shelter and keep the laborers from being exposed to the rain or hot sun.

I must say, I have in many instances seen cane going to the mill very imperfectly stripped, so that cane and dry leaves went together through the rollers; on examining the bagasse of such cane, I found the leaves drenched with cane juice, which went in that state with the bagasse to the banks of the river. Neither of the rollers can be set close enough to press a leaf which is almost as thin as a sheet of stout paper; the consequence is, that the leaves which have absorbed a quantity of juice in passing through the first roller, pass

untouched through the bagasse rollers, and carry away a considerable quantity of the best juice.

Drying bagasse.—To dry the bagasse immediately after it leaves the mill, has been a subject of much speculation and experiment. If it could be effected so as to dry the bagasse thoroughly that it can be used as fuel under the steam boilers and kettles, it would be an improvement of great importance to the planters, especially on such plantations where fuel is scarce.

George Merrick has obtained letters patent for a mode of drying bagasse, dated April 10, 1845; from the specification of said patent I give here the following extract, with a ground plan of the apparatus.

"The bagasse, as it leaves the rollers, by which the juice has been pressed out, is received on to an inclined slide or shute, down which it passes on to an endless apron formed of slats of iron, which are connected together by suitable links. This apron is kept in motion by power derived from the steam-engine employed in the works, or by any other adequate means.

"The endless apron passes around reels or drums, at each end of a range of horizontal flues, through which the apron, with the bagasse deposited upon it, is to be conducted. The flue, also, which is intended to convey the heated air and smoke into the chimney from the steam-boiler furnace, or from that under the boilers used in the manufacture of sugar, is made to extend along and through same range, through which the endless apron is to pass, said range of horizontal flues being thereby divided into three flue spaces or compartments; along the uppermost of these compartments the endless apron, with the bagasse upon it, is to pass, and said apron is to return along the lower compartment after having deposited the dried material upon a receiving plate, or platform, in front of the furnace, or otherwise conveniently situated for that purpose.

"The fire flue, for the purpose of conducting the heated air from the furnace to the chimney, is situated between those along which the endless apron passes. The top of this fire flue is to be formed of sheets of cast iron or other suitable material, which will allow of the passing of heat through it into the upper or bagasse drying flue; upon these plates, there should be projecting ribs or ways, upon which the slats of the endless apron may slide, which will not only enable them to do so unobstructedly, but will allow the heated air to pass freely around the material to be dried. The length of the horizontal flue must be varied acccording to the circumstances of the particular case, as in some works the escape heat will be much greater than in others; for this, therefore, no particular rule can be given, but the point must be decided by the judgment and experience of the constructor.

"When the heat is great, the flue may be of less length than when it is moderate; and the effect may be regulated by increasing or diminishing the motion of the endless apron; it is desirable, however, that the motion of this should be the same with that of the carrier that supplies the mill with cane. The escape steam may be used to increase the draught, should it be found necessary, or this

may be effected by means of a fan or other apparatus used for that purpose. In the accompanying drawing, figure 35, represents a plan or top view of the apparatus with the range of horizontal flues, and the receiving plate or hearth for the dried bagasse.

The endless apron is not represented.

L, L, L, are the rollers made use of to express the juice from the cane. M is a shute or slide inclined downwards to cause the bagasse, when it leaves the rollers, to pass on to the endless apron or bagasse carrier. The reels or drums, around which the endless apron passes, are shown at B, B^2; one of them being placed at each end of the range of horizontal flues. D, D, represents the boilers of a steam engine, or the place of a range of sugar kettles, from the furnace of which the heat for drying the bagasse is to be derived; the escape heat from such furnace is to enter the fire flue H, which constitutes the middle flue of the range of flues. Cast iron plates constitute the top of this flue.

The flue immediately above the fire flue, H, is for the passage of the endless apron with its load of bagasse, and the flue below the fire flue is for the return of said apron after it has deposited its load on the receiving plate, E, or into any convenient receptacle. H′ is a flue leading from the flue, H, to the chimney, K, into which it conducts the heated air and smoke after they have traversed the length of the flue, H.

Into the bagasse or drying flue, atmospheric air is to be admitted, to carry off the vapor given out in the process; and at each end of said flue I place a sliding shuttle or register of iron, for the purpose of regulating the quantity that shall be allowed to enter; the lower edge of these registers may be brought as low down, particularly at the end where the bagasse enters, as the endless apron and its load will admit. There is also a flue leading from the bagasse flue into the chimney, K, to carry off the vapor extricated in the drying process.

The bagasse carrier or endless apron may be made to revolve in various ways.

A pulley is attached to the shaft of the engine; or, if preferred, to the shaft of the rollers. Another pulley is attached to the shaft, N, N, upon the end of which is affixed the bevel wheel, X, that gears into the bevel wheel, Y, upon the end of the shaft B^2; which, it will be seen, will produce the desired effect.

The bagasse should be delivered on to the endless apron at a short distance before it enters the flue, to admit of the falling through between the slats and on to the ground of any pulpy matter, and of such shreds as may be too small to be sustained on them.

ANIMAL CHARCOAL.

Animal charcoal is not very extensively used by the Louisiana planters. So far as I could ascertain, it is only employed by those who use vacuum pans, Dérosne's or Rillieux's apparatus.

Its peculiar property of decoloring and purifying sirups has been sufficiently established by its extensive use in the refineries and beet sugar manufactories. Those who wish to become acquainted

with the decoloring power of boneblack have only to visit the plantations where the improved plans of boiling sugar are used; there they can see how clear and slightly colored the juice and sirup comes from the boneblack filters, and how beautiful the sugar looks made from sirup filtered in that way.

Those planters who boil in open kettles would improve there sugar much by the use of boneblack, and might always calculate upon the highest prices of brown sugar.

Large wine or rum puncheons would answer for filters. One of the juice boxes, when provided with a series of copper pipes, could be used for a defecator, and a revivification furnace would make up the whole expense of apparatus. The greatest outlay would be in the first purchase of the necessary boneblack. For a plantation making 500,000 pounds of sugar, about 100,000 pounds of boneblack would be sufficient. Boneblack costs from 2½ to 3 cents per pound. There is always a loss of boneblack occasioned by the various charging and discharging the filter, fermenting, washing and revivifying the boneblack, which amounts to about 12 to 15 per cent. a year.*

After the boneblack has been used for decoloring a certain quantity of sirup, it must be revivified again. The boneblack is taken from the filter, suffered to ferment, in order to free itself from the coloring matter and gluten, &c., which it has abstracted from the sirup or juice. When the organic matter is decomposed by fermentation, the boneblack is washed, dried, and calcined, whereby it acquires again its full decoloring powers, and it can be used over and over again.

The Louisiana planters revivify the boneblack by calcination, viz: the boneblack after having been left for several days to ferment, is washed, dried, and then calcined in retorts, or by means of Dérosne's apparatus, hereafter described.

Various methods have been contrived to effect a perfect revivification; but they are either too complicated, expensive, and require too much manual labor.

It is a subject of great importance to revivify the boneblack perfectly, and with little waste, expense of fuel, and labor.

The various methods employed to revivify boneblack by calcination are—

1st. To calcine it in closed iron pots.

2d. To calcine it in vertical or horizontal retorts.

3d. By means of highly heated steam.

4th. In open revolving cylinders.

The calcination in the iron pots is unquestionably the best method, since the boneblack comes the least in contact with atmospheric air, the pots are closed with iron covers, and luted with clay. This method, however, has been generally abandoned, because the expense of labor and the loss of pots from burning were too great, and overbalanced all its advantages.

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*The author "On sugar cultivation in Louisiana and Cuba, London, 1848," says: "The renewal of animal charcoal gives a waste of 6 per cent. on each re-burning."

The calcination in vertical cylinders was very extensively used in France and Germany until within in a few years.

The apparatus used for it consists in upright cylinders, closed with iron covers at top and bottom, and set in a proper furnace. With this kind of furnace the animal charcoal can be well revivified, and very little of it is burnt; but it requires a very strong fire, in consequence of which the cylinder (having about six feet length and 10-inch diameter) are frequently burnt, occasioning great expense and delay.

The great diameter of the cylinder prevents the heating of the boneblack in the centre, and the inconvenience in discharging the cylinder from below, renders their use still more impracticable.

The mode of revivifying boneblack in gas retorts is used by some planters in Louisiana; it has the same objections as the above, and differs only therein—that the above mentioned retorts are placed vertically and these horizontally. The former have yet the advantage of being emptied with less difficulty.

The most ingenious method of revivifying boneblack was invented in France, and introduced into other countries. But, in consequence of being very complicated and costly, its use was not very extensive. The apparatus consists in a steam boiler for generating steam of about 60 and 80 pounds pressure. The steam passes through a serpentine of wrought iron welded together, about 3 inches in diameter and $\frac{3}{8}$-inch thick, which is heated to red heat, in order to impart to the steam a temperature of 700 and 750 degrees. This highly heated steam passes into a tight conical reservoir in which the boneblack is placed, allowing the steam and condensed water to escape at the bottom of it, carrying with it all the impurities contained in the boneblack, which, after an operation of from 7 to 8 hours, is perfectly revivified.

But the serpentine is exceedingly costly, difficult to construct, and burns by the least inattention of the firemen. The vapors arising from the operation are very pernicious, on account of their bad odor. The whole apparatus costs about six times as much as the furnaces with vertical retorts. It revivifies, perhaps, in a given time, more than those with vertical retorts, but it consumes a much greater quantity of fuel, and requires great attention.

Mr. Benjamin, of Bellechasse, who lately turned his attention to sugar growing, speaks of this apparatus, which he saw in operatian in Paris:* "Much talent and labor have been expended in devising the best means of economical and effective revivification, but I have heard of none so satisfactory as that by heated steam, which I saw employed on a very large scale at two refineries near Paris. The black is thrown into a heap, after being used and allowed to ferment; it is then thrown into a cylinder, and steam heated to 750° Fahrenheit is driven through it. The steam is heated by being conveyed through pipes placed in a furnace, so arranged as to heat them red hot without the actual contact of the

* See De Bow's Commercial Review, vol. 5, p. 52.

fire, which would otherwise soon destroy them. Nor is this process at all attended with the danger which might be supposed to result from the great degree of heat imparted to the steam. The action on the boneblack is at once to destroy, by combination, all the organic matter absorbed into the pores of the charcoal during its use, and the purgation of all impurities. The boneblack when taken from the cylinder, is simply sifted, and is found then to be fully equal to new boneblack; and one of the refiners stated that he considered it as constantly improving by this process.

This mode of revivification is cheap, simple, and superior to any with which I am acquainted. The proper degree of heat in the tubes is very simply indicated by dropping in them an alloy, which melts at 750° Fahrenheit. When the alloy begins to melt, the boneblack is discharged, and a fresh charge introduced into the cylinder.

Dérosne was the first who employed animal charcoal in refining sugar, and in the manufacture of beet sugar, which, since then, has been brougt to great perfection. Dérosne invented, also, a revivifying apparatus which he describes in his patent for a boiling apparatus. The following is the description of the apparatus taken from the specification:

"The apparatus for restoring animal charcoal is composed of a cylinder, F, represented in fig. 36, (a section,) placed in a position a little inclined from the horizontal, and on the upper part of its shaft (K) there is a screw (m) that is placed in the lower part of a hopper into which the coal from the filters is put; by the revolution of the cylinder, the screw that turns with it conveys the coal from the hopper, and then gradually passes down the cylinder and out at the lower end. The cylinder is surrounded by brick work D, leaving a sufficient space between them for the circulation of heat all around the cylinder; below the point or lower end of the cylinder, there is a furnace, S′, built in the brick work, and one-third of the distance between that and the hopper, there is another furnace constructed in a similar manner; the smoke is conveyed off near the hopper by means of a pipe (E) passing through the top of the furnace. The animal charcoal going into the cylinder, is gradually heated up and dried as it passes over the furnace, (S′,) and so down, approaching still nearer to the fire at the furnace, (S′,) where it is heated up to a red heat, and in the most perfect and equal manner; thus subjecting each particle, by a gradual increase, to the highest temperature required, without overheating and spoiling any, as it is absolutely necessary that the coal should be only heated up to a dull red that requires a dark place to be distinguished in. The black is then fit to be used again in the filters. The cylinder may be turned by any mechanical means, and the fires should be regulated with accuracy.

"Instead of the animal charcoal above mentioned, and which is constantly growing dearer and more difficult to obtain, I have inserted a substitute, which I denominate vegeto-mineral black; considering it a principle, that the molecular division of carbon, combined with a certain porosity in the texture of animal charcoal,

was the cause of its whitening properties, I have produced a compound which seems to unite these two properties, that may be produced in all sugar works in any position.

"The principal ingredients used to supply the carbon is saccharine matter combined with a clay base to give it more consistence. The saccharine I use for this purpose is taken in the form of molasses or the residuum of syrup, which is rarely of much value in sugar works; this is mixed with a white or grey clay, as they contain little or no iron. Take any quantity of this clay, and about one-third as much molasses by weight, to which is added about the same quantity of water, pour the liquid into a reservoir, and mix the clay with it gradually and uniformly, so as to form a homogeneous mass, the paste thus produced will have the consistency of stiff mortar; iron cylinders are then filled with this mortar, care being taken to dispose of it in layers of three or four inches in thickness. When the cylinders are full to within an inch of the top, three or four holes are made through the centre of the mass with a stick that will reach the bottom, and one or two pieces of wood may be introduced in the middle of the mass to accelerate carbonization, which is effected in the same manner as the process of carbonizing bones. The pulverizing and sifting is also similar to the process used in forming the animal charcoal.

"The vegeto-mineral carbon thus produced, has the appearance of the finest animal carbon, and its whitening properties are equal thereto with a still higher power of absorption. It is quite as solid, is not disturbed by the water, and may be used either coarsely or finely powdered like the animal carbon.

"This black may also be revived in precisely the same way as was before described for animal carbon."

Dérosne intended to bring the heated bone black in contact with the air, to prevent the fusing of organic matter which has been absorbed by the bone black during the filtration of the sirups, which happens when calcined in close vessels, producing a bone-black with a brilliant lustre, but of less dissolving power. But this apparatus has the inconvenience that, in case the boneblack is not highly heated, the revivification is imperfect; and when the coal is heated up to a high degree, the contact of air produces combustion, and causes a great loss of coal. I consider, therefore, this kind of furnace the least economical for the planters, and do not see how it could be improved to avoid the inconveniences pointed out; besides, it requires mechanical arrangement to keep it in motion.

For the year 1846, a new apparatus was invented, and from its simplicity and practical construction, perfect revivification of the coal, and easy management, several hundreds of them were introduced at once in France and Germany by the beet sugar manufacturers and refiners, and replaced nearly all other furnaces of that description.

For the description and drawing, I am indebted to Mr. B. Andreae, civil engineer, who visited the United States with the view of becoming acquainted with our improvements in steam navigation

and sugar works. He was extensively engaged in the construction of various apparatus for the manufacture of beet sugar in Magdeburg, (Germany,) where about 200 very large factories are in operation, conducted in the most perfect manner.

Mr. Andreae enumerates the advantages of this furnace:

1. An easy and uniform revivification without producing burnt coal.

2. The tubes are not liable to be burnt, because the furnace is heated with a small fire, spreading over a large grate.

3. In 24 hours this furnace is capable of revivifying 10,000 pounds of animal charcoal with a very small quantity of fuel, whereby great economy of fuel is obtained.

4. The management is exceedingly simple, requiring less labor than any other mode of revivifying, because this furnace requires nothing else than the opening or closing of the slides whereby the tubes are emptied and filled.

This furnace, which is represented in figure 37, is a section through the dotted line *x*, *x*, of figure 38; and figure 38 is a section of figure 37, through the dotted line *o*, *o*; it consists of 28 inclined tubes A A, (see figure 37, and figure 38,) 14 on each side, resting upon bottom plates, B, B, with openings corresponding to the size of the tubes A A; the tops of the tubes fit in a hopper C, the openings of which are covered with boneblack, D; and when the tubes are to be emptied, the slides, E, are to be closed, to prevent the boneblack which covers the opening of the tubes, and which is not yet revivified, from falling into the tubes.

The heap of boneblack which rests upon the tubes prevents the access of air into the tubes, and causes a more perfect revivification.

Below the bottom plates, B, are channels, *a*, *a*, in which always two tubes, A, A, empty, built of masonry work; a cast iron pipe, b, fits into a sheet iron box, *c*, which holds the quantity of two tubes, A, A. When this sheet iron box, or cylinder, is filled with revivified boneblack, it is immediately closed with an air-tight cover, removed, and an empty one put in its place.

A wide grate, H, reaches the whole extent under the tubes, and as the fire is below, the heat encircles them, and is carried, by means of flues, I, which are connected with the upper flues, K, K, leading the heat under cast iron plates, L, L, L, forming a platform, and used to dry the boneblack before it is put in the tubes.

When the tubes become heated to a certain degree, which is ascertained by observation and experience, they are to be emptied; which can be done every half hour in properly constructed furnaces.

To ascertain that proper degree of heat required for revivifying the boneblack, the following method can be practiced. A piece of bone, say the size of a finger, is introduced from above in one of the tubes, and when that piece of bone is properly calcined, the revivification is complete.

The operator should then observe with care the color which the

tubes have assumed, and for the future discharge of them every time they have reached that same degree of red heat.

The evaporation of cane juice is accomplished in Louisiana:

1. By the common *open kettles.*

2. By *open kettles* in which the juice is concentrated to the density of 29° to 30° Beaumé, and afterwards boiled to the striking point in high pressure *open steam pans.*

3. By *open kettles* which concentrate the juice to 29° to 30° Beaumé, and finish it in *vacuum pans.*

4. By boiling all together in *open high pressure steam pans.*

5. By concentrating the juice in *open high pressure steam pans* to 25° Beaumé, and boil it to the striking point in *vacuum pans.*

6. In *vacuo altogether:*

a. By two vacuum pans, one for reducing the juice to sirup, and the other to boil it for striking.

b. By Degrand's (called Dérosne's) apparatus.

c. By Riellieux's apparatus.

1. *Open kettles.*—When cane juice is evaporated in open kettles, consequently under the atmospheric pressure, heated by fire or high pressure steam, the sugar is always more or less burned or carmelized, especially when the evaporation is carried on slowly, and the juice kept a long time in contact with the heated surfaces. Experience has shown that, when the evaporation of saccharine liquid is carried on rapidly by means of a high temperature, the color of the sugar and its crystallization are less impaired. This has been partly effected by enlarging the chimney of the kettle furnace, which was formerly not wider than about 12 by 14 inches. This improvement came into use about the year 1833, and the planters have since been enabled with the same set of kettles to evaporate three times the amount of juice, producing sugar of a better quality, lighter color, and considerably diminishing the amount of molasses.

The next important improvement in the open kettle system was made the year after, and consisted in placing two *grandes* at the end of the furnace instead of one, and having two different flues, provided with dampers, constructed in such a manner that the draft can be directed at pleasure under the one or the other, whereby the defecating and boiling of both is under the control of the sugar boiler, permitting him to stop the heat under the one or the other kettle at the precise moment required for skimming.

Since that time several improvements have been made in the mode of setting and constructing kettles for boiling sugar, and patented in the United States. The following descriptions are extracts from the specifications of said improvements, with drawings to illustrate them:

Francis Hoard obtained a patent, dated 30th May, 1838, *for a circulating sugar boiler:*

"The apparatus is filled with cane or other juice to within about 18 inches of the top; as the juice boils, more must be received into compartment No. 4—see fig. 39—and from thence charged forward into compartments 3 and 2 progressively, by means of the

cock B B. No. 1 is the striking teach or finishing compartment, and must be charged by dipping or ladling the liquor from No. 2. The large cock C being opened, the sugar will pass directly into the coolers, which must be placed a little below the level of the cock. In taking off a strike of sugar, care must be had in shutting the cock as soon as the surface of the sugar comes down to the level of the top of the flue; after which the teach must be changed immediately, in order to prevent the sugar remaining in the teach from running too high, or burning.

"The process of skimming is exceedingly simple. The compartments 1, 2, and 3, in a great measure skim themselves; most of the skimmings deposite themselves in the back end of the compartment 4, from whence they can be removed with very little labor; and will be quite often enough to boil off, as it produces waste of fuel and manual labor, and the apparatus will not require cleaning oftener.

"In boiling off, the liquor will be charged forward by means of the cock B B, until it comes down nearly to the level of the flue, when the cock B connecting the compartments 3 and 4 must be closed, and the remaining liquor in compartment 4 drawn off by means of the cock underneath into a box or cistern, wherein should be placed a pump for charging it up into compartment No. 3. The same cistern and pump will answer for charging the liquor from any one compartment to another.

"As soon as any one or more compartments are emptied of liquor, they must be filled above the flue with water. Before taking off the last strike of sugar, the fire must be extinguished, when all the sugar may be discharged and the teach charged with water.

"An instrument similar to the one used for cleaning the inside of gun barrels will be found serviceable in cleaning the tubes, and one upon the same principle will answer for cleaning the sides of the flue."

Reference to the drawings.

Fig. 39, A, A, A, A, the cast iron vessels in four pieces.

Fig. 40, H, H, H, H, the flue joined to the cast iron vessel at the flanch I, I, I, I.

The compartments numbered 1, 2, 3, 4, B, B, the bent pipes or cocks connecting the compartments 2, 3, and 4.

C, the large cock for drawing off the sugar.

D, the door for the convenience of cleaning the flue.

J, the brick furnace.

E, the skimming gutter.

F, F, F, F, the doors affording facility of cleaning and repairing the boilers.

Q, the cane juice, (see Fig. 40.)

John Penny obtained letters patent, dated 25th September, 1837, for *a new mode of setting sugar kettles*, whereby he obtains complete command of the necessary degrees of temperature, both in heating and cooling the pans, kettles, boilers, or clarifiers em-

ployed, which is effected by means of dampers and air flues—the former shutting off the heat at pleasure, and the latter admitting a current of cold air to circulate round the vessels when the heat has been shut off, and it becomes desirable to produce rapid cooling, as he has carried into effect by his experimental apparatus on Wilson Island sugar plantation, Louisiana.

Fig. 41 is a vertical section along the range of boilers, &c., which is shown as containing one granulating pan, four kettles, and three clarifiers. A is the granulating pan, B the batterie, C the sirop, D the flambeau, and E the grande. F, F, F, are three clarifiers. These are all to be set in masonry in the usual way. H is the furnace grate, the heat from the furnace being conducted under all the vessels by means of proper flues. The flue G leads from the furnace under the batterie directly into the space under the granulating pan A, whilst the main flue G^2 extends under the kettles and clarifiers, as seen in the drawing, I, I, I, I, I, are openings for the flues through which the heat passes up to the granulating pan and to the clarifiers; and to these openings valves or dampers are adapted by which the communication of heat is completely intercepted.

Fig. 42 is a top view of the whole range. The posts, marked L, L, are the spaces surrounding the granulating pan and the clarifiers; and also the air flues leading into and from them. These, of course, would not be seen in a top view, without supposing a horizontal section to be made in the part of the range containing these vessels at such a level as to cut the flues. M, M, are flues leading into the chimneys N, N, serving as a common outlet either of heated or of cold air, and the dotted lines o, o, are to mark the existence of flues for admitting cold air to pass in and surround the granulating pan and clarifiers, after the dampers j, j, j, have been closed; these flues have close fitting doors, stoppers or registers, by which they may be closed perfectly or opened in any degree that may be necessary to effect the cooling process. When opened, there will be a rapid rush of cold air, consequent upon the previous heating of the chimneys, so as, if desired, to cool the vessels almost instantaneously. There may be such numbers of these air flues as may be preferred, and they may be varied in their arrangement without altering the principle upon which they operate.

To *A. Hagers* letters patent were granted, dated March 9th, 1844, *for a new mode of setting kettles;* fig. 43 of which represents a top view of the stack with the kettles in their proper places; fig. 44, is a vertical longitudinal section.

The stack A, furnace B, ash-pipe C, flues D, kettles E, chimney F, are made in the usual or most improved manner. The main improvement consists, 1st, in constructing spiral flues G, beneath the grandes and clarifying kettles E^1 E^2, increasing gradually in size as they wind around the kettles and approach the flue F, with a partition H, and an enlargement of the flue at G^2, by which a spiral draft is produced around and under the bottoms of said kettles, and a more active and intense heat and quicker draft, causing the

kettles to be heated with a much smaller quantity of fuel and in less time than in the old plan; the said flues, after encircling the bottoms of the kettles, and driving down obliquely under them at G^3, and then passing off through flues G^4 (shown by dotted lines) towards the chimney F, and uniting in a single flue at G^6, where a valve, I, is placed for opening or closing either of said flues G^4, at pleasure; 2d, in making said valve I, and its stem or axle J, hollow, and filling the same with water to take off the intense heat acting on said valve, thereby preventing it from being warped or consumed; 3d, in constructing the bottom of the granulating kettle K, concave on the bottom surface next the fire at K^2, for producing a more direct action of the heat applied to it in a circular corresponding flue, L, constructed under said kettle, which is formed with a partition, M, therein, for the purpose of preventing the heat passing to the chimney before it has circulated around and under the concave bottom of the said granulating kettle, whose lower edges rest upon the brick seat or bed, except at a place L^2 near the partition, where a space is left open for the draft to pass under the edge of the kettle to the flue L^3, formed around the outside of the kettle K; 4th, in the construction of a flue, N, in the stack, extending nearly its whole length, leading from the granulator to the chimney, in which a slide valve is placed for opening or closing said flue when required; 5th, in the arrangement of a hinged valve, Q, in the flue R, leading from the furnace to the flue or space under the granulator for regulating the heat applied to the same; 6th, in the construction of man holes, S, under the kettles for removing accumulated dirt or ashes from under them. The hollow valve I, filled with water, to prevent being consumed by the intensity of the heat, is made in the shape of a hollow wedge, through which, at the back, is passed a vertical hollow spindle, J, having a funnel-shaped mouth or top, by which it is filled with water kept always at the requisite height, by stop-cock, or float, or other convenient apparatus. The hollow spindle has a pivot at the lower end, and its upper end passes through the brick work and turns therein, leaving the funnel top above the stack. This valve is turned to the right or left by a handle, h, for opening or closing the flues G^4 at pleasure, more or less for regulating the heat under the grandes and all the kettles of the stack. The granulating kettle K is made with a concave bottom as represented at fig. 44, having a circular ring around its largest diameter for strengthening it while hoisting it from its bed, and a circular rim, r^2, above said ring, being a continuation of the side of the kettle vertically above the brick work, to prevent boiling over, having trunnions at the sides, to which a common bale handle is attached, for suspending it by a crane or other appartus for lifting and tilting it in discharging its contents, being provided with a handle for canting or reversing its position. The granulating kettle rests upon a suitable seat or bed formed in the stack near the furnace.

The circular flue L, under said granulating kettle, is formed in the brick work, by carrying it up at M^2 in the centre of the cavity (made to receive the kettle) above the horizontal bed upon which

the kettle rests, into the concavity or bottom of the kettle, to a sufficient height to leave a space for a flue for the proper circulation of the heat therein.

Another flue, L^3, is then formed around the outside or convex surface of the kettle, commencing with the aforesaid flue formed in the concavity of the kettle, by means of the continuation of the flue under the lower edge of the kettle at L^2, near a partition, M, constructed in the outside flue for causing the draught to pass around the kettle before it passes to the flue N, leading to the chimney F.

A flue is constructed in the brick work leading from the furnace B to the flue L, under the granulator K. A hinged valve, Q, is placed in this flue for letting or shutting off the heat to or from the granulator. Before hoisting the granulating kettle from its seat or bed, this valve must be closed. Likewise the side valve in flue N.

The flue N leading from the circular flue under the granulator to the chimney, commences near the partition M, and dives obliquely downward, then turns horizontally and continues in a straight line till below the grandes; it there takes a turn towards the middle of the stack; from thence it leads to the chimney F. A slide valve is placed in the flue for regulating its draught and for preventing any interference with the draught of the chimney, where the granulating kettle is raised from its seat by the entrance of cold air at the said flue.

The man holes S, for receiving the dirt and ashes collected in the flues under the kettles, are constructed in the brick work near the bottom thereof, and are cleared in the usual manner. The draughts being caused to pass around and under the kettles in the manner described, increases their length, and consequently their strength, which is likewise augmented by gradually improving the size of the flues as they recede from the furnace, and their spiral or circular course tends also to promote an increased draught under the kettles, and causing the flues to descend under the grandes, as set forth, enables the constructor to do away with the necessity of occupying the space around or behind the kettles in the boiling room required for the tender of the kettles, by a mass of brick work required to admit the flues, where they are arranged above the level of the floor of the boiling room.

A hinged spout or trough, T, is placed on the top of the stack, for conveying the boiling cane juice to the granulating kettle from the kettle over the furnace. I do not claim the invention of spiral flues; but what I do claim as my invention, and which I desire to secure by letters patent, is the use of spiral descending flues under the grandes, as above set forth. I also claim the arrangement of the flues L, L^2, L^3, in combination with the concave bottom of the granulating kettle K, as set forth.

I likewise claim the hollow valve, I, filled with water, to prevent burning out, arranged and operated in the manner and for the purpose set forth.

James Maloney obtained letters patent for *an improvement in setting kettles*, dated September 10, 1838.

"As boilers are usually set in brick work alone, the bricks at their rims are placed on end, standing at an angle of 45 degrees, making a fragile structure, which soon breaks down. In my improved mode of setting, the rims of the kettles rest upon hoops, or circles, of cast iron, which I make about six inches wide, and two inches thick. In the accompanying drawing (figure 45) is a top view of four boilers, A, B, C, and D, as ordinarily arranged; *a*, *b*, *c*, and *d*, are four cast iron rims resting on the brick work, and adapted in size to the respective boilers which pass within, and have their rims resting upon them.

"Figure 46 is a vertical section through the centres of the boilers, the furnace, and the flue, E, being the furnace, and F the termination of the flue leading to the chimney, G.

"The sections of the iron rims are shown at *a*, *b*, and *c*, and *d*, and these are so formed on their upper sides as to receive and embrace the brick work, which constitutes the ordinary divisions between the kettles."

Colonel *Maunsel White*, of Deer Range, Plaquemin, Louisiana, invented a new mode of setting kettles, for which he obtained letters patent, dated September 17, 1839. The following is an extract from the specification on record, of the U. S. Patent Office:

"In this arrangement the kettles are so placed as to surround the stack or chimney for the escape of smoke, and they have a circular arch underneath them, along which the draft from the fire passes. I sometimes, however, place the kettles in a circular arch, and erect the chimney on the outside of said circle, but in either case, the plan of setting the kettles is the same.

"Fig. 47. A, in the accompanying drawing, is a plan of the top of the arch and kettles when completely set and finished, and also of the frames or margin of wood or other material which form the compartments by which the kettles are surrounded and separated from each other. No. 8 shows the chimney flue arising from the centre of the structure; the kettles are numbered respectively from No. 1 to No. 5, on each side, No. 1 being the battery or first kettle standing out of the circle, and immediately over the furnace.

"Fig. 48 is a horizontal section or plane immediately below the kettle. d is the place of the grate bars of the furnace under the battery. From the furnace the flues run under the other kettles in both directions until they meet on the opposite side of the arch, as at 6′, whence the flues 6′ lead into the chimney at 7. G G shows the places of the canal into which the ashes are to fall."

There is also described a variation of the plan of setting the kettles in a circle, the battery, with its furnace, and also the flues and arches, being constructed in the manner already explained; but, in this plan, the chimney is placed without the circle, and so also are two additional kettles. The flue, in this arrangement, instead of passing inwards from under the series of kettles on each, passes outward and into the chimney, the two channels being regulated by dampers, as in a former instance. By this arrangement, a single fire is made to operate on two series of kettles, whilst, as heretofore constructed, it could act upon one only, and a double quantity

of juice could, therefore, be operated upon at the same time; and even a larger quantity with the aid of two additional kettles. The economy resulting from this mode of setting kettles is not, however, limited to this circumstance, but it has been proved, experimentally, that, owing to the circular form, the heat is concentrated in a much smaller space, whilst the surface of the flues, being spherical, and from this cause approaching more nearly the surfaces of the kettles, the current of heated air which passes around them is more directly applied to them than in the straight arches heretofore constructed, and a more rapid evaporation is consequently effected.

The following description of boiling sugar in open kettles is the old Creole style, which I witnessed at a plantation in the parish of St. Bernard:

The juice, as it came from the mill, was collected in large juice boxes, holding many hundred gallons, where it remained until drawn off for boiling. A strainer was used to separate the scum, cane pieces, and trash, from the juice. The juice was skimmed in these boxes preparatory to boiling.

The old Creole mode is to boil in four open kettles with hemispherical bottoms, comprising what is called an *equipage*. The first and largest kettle is called the *grande*; the second, *flambeau*, so called because the point of the flame reaches that kettle; the third is the *sirop*, or sirup kettle—here the juice is boiled down to the density of sirup; and lastly, the *batterie*, or sticking pan. Some have an additional kettle between the *sirop* and *grande*, called *proper-clear*, because, in that kettle, the juice begins to be clear and transparent.

The kettles used to be mostly of cast iron. Some use kettles made of sheet iron, which are more durable, but rather expensive. The kettles of an equippage, or set, are of different capacities, holding from one hundred to four hundred gallons. After the kettles have been all filled, the fire being started in the furnace, the heat passes on its way: first, under the *batterie*, then under the *sirop*, *flambeau*, and *grande*, beyond which it enters the chimney. As soon as the juice begins to approach the boiling point, the lime is added. The scum rising to the surface is carefully ladled off, and thrown into a proper receiver. In proportion as the juice is evaporated, the kettles are supplied from the *grande* until this is nearly empty, when it is filled from the juice boxes. Lime is again here added, the scum taken off, and, when the juice is sufficiently clean and clear, it is gradually added to the more concentrated juice of the *flambeau*, *&c.*

As soon as the sirup in the *batterie* has reached the striking point, it is almost all turned out into the cooler, and immediately recharged with a fresh supply from the *sirop*, in order to prevent the burning of the kettle and its contents. The *sirop* then is replenished from the *flambeau*, and this from the *grande;* this last one being, as soon as it is emptied, again supplied from the juice boxes. And thus the rotation is continued to the last drop of juice. The operation requires, for every kettle, a hand to attend

to the necessary skipping out, and what is called to the "brushing off," which consists in taking off the scum, or other impurities, which will rise to the surface during the process of boiling of the juice or the sirup. The kettles are kept full up to their brim, around which is a kind of rim of masonry, rising about six inches above the brim of each kettle, and enlarging towards its top; this space is filled with the froth caused by the boiling, and on its surface floats the impurities. The men appointed to watch over the kettle use a thin bat, with a convenient handle, to sweep, or rather brush off, from the *sirop* into the *flambeau*, all the floating stuff as it comes up. The man at the *flambeau* brushes it into the *grande;* the man attached to the *grande*, or last kettle, ladles the scum out into a bucket.

During the transfer of the juice, sirup, and strike, from one kettle into the other, and ultimately into the cooler, a great portion of the surface of the kettle being exposed, during this process, to the flame, necessarily becomes highly heated and burns the part of the liquid which is in immediate contact with the almost red hot sides of the kettle.

This unavoidable injury has made Dr. Ure call the set of open kettles, not without truth, "sugar frying pans," for in fact at the moment of transporting the liquor from one kettle to another, the burning of the sugar is so great that a strong odor of carmelized sugar is emitted, which is perceptible even at a great distance from a sugar-house where sugar is boiled in this manner. The kettles are often burnt in consequence of the incrustation which forms in them, especially the *grande*, which is always incrusted with a thick coating of scales that require a chisel to be taken off. There is less in the other kettles in proportion as their contents become purified.

The quantity of lime or temper used in defecation is generally made the matter of a secret by the sugar boiler. He varies the necessary quantity according to the state of the cane. When he boils juice from good ripe cane, he puts from five to eight ounces; when from rank cane, grown on new ground, or when high topped or frozen cane, the doses vary from fifteen to thirty ounces, regulating the quantity according to the appearance of the scum, which rises in the *grande*, *flambeau*, and *sirop*, and also by the color and limpidness of the strike in the batterie.

When the scum, floating on the surface of the juice or sirup, is in small detached lumps, and frees itself easily from the liquid, when the eyes of the boiling juice are small and clear, and when it is nearly transparent and of a pale color, like Madeira wine, then the quantity of lime is considered as sufficient. But if the scum rises in large agglomerated lumps of a fat appearance, and the eyes look large and greasy, like soap bubbles, there is a deficiency of lime. When the sugar, after having had sufficient time to make a thin crust in the cooler, forms instead of it a kind of froth, which can be drawn together with the finger, this is another sign that the juice had not enough lime.

When there is an alkaline smell, or the sugar boiler hears a

whizzing noise in the kettle, he knows that he has given too much lime or temper.

When the sirup in the striking pan runs off the bowl of the ladle thick, like glue, it is another sign that there is not enough lime given; but when the sirup breaks off short and lively, the quantity of lime is sufficient.

The lime, before it is added to the juice in the *grande*, is first slaked in about two or three gallons of juice. The quantities of lime used for defecation are generally measured; the doses vary from five to thirty ounces, and even more, for one charge of the *grande*. The quantity must be increased and decreased during the day, according to the state of the cane, being either more or less rich in juice, or in consequence of having grown upon moist land, or such as has been touched from the frost.

The fireman has the most laborious task to perform during the boiling season, he has to keep up continually a strong fire under the kettle; when the fire is in the least allowed to go down, the sugar boilers call out to him to fire up, and a new supply of wood is forced into the red-hot furnace. The amount of fuel consumed is enormous, varying from two and a fourth to five cords per hogshead, according to the state of the cane.

The economy of fuel depends a great deal on the proper construction of the furnace and chimney. I have seen the flame rising several feet above the top of the chimney; and it is easily inferred that the consumption of fuel, in such furnaces, must be very great. The vapor arising from the boiling juice is carried off into the air by a large chimney.

Those who know the amount of heat contained in that mass of vapors cannot but deplore the enormous waste of fuel and caloric.

The sugar obtained by that obsolete method must invariably contain a large proportion of burnt or carmelized sugar, the crystallizing power of which being impaired, drains off from the crystallized sugar into the cisterns as molasses.

Even if the operation of boiling is carried on with the greatest care, the burning is unavoidable, and the color of the sugar must invariably be affected by it, making it more or less brown. The crystals are small, and the loss by drainage during transportation excessive.

It can be fairly set down, that, for every hogshead of sugar of about 1,000 pounds, the drainage of molasses in the sugar-house amounts to 55 gallons of 12 pounds, or say 660 pounds; which quantity, at the actual price of 20 cents per gallon, or $1\frac{2}{3}$ cents per pound, would, if turned into sugar, bring double that price.

I have seen molasses sugar, made by the improved methods with vacuum pans, which was better than *fair*, selling at five cents, or nearly double the price of the common kettle sugar.

By the old method of boiling sugar we have therefore—

1st. A laborious operation.

2d. A notable loss of fuel.

3d. A deep colored sugar.

4th. A large quantity of crystallizable sugar turned into molasses, and hence a reduction of income.

2. *Open kettles and open steam pan.*—In this mode of boiling the juice is concentrated in open kettles to a certain degree, and brought to the striking point in steam pans.

The first steam pan was introduced in Louisiana in the year 1829; it consisted of a serpentine tube coiled up at the bottom of a circular pan. Whether from the defective construction of the worm, or from want of knowledge in the management of this pan, they were set aside for nearly twelve years, when they came again into use. Pequeur's pan has been since introduced with some improvements.

This combination of open kettles and open steam pans offers not the slightest advantage in regard to the economy of fuel, because the evaporation by steam consumes as much combustible matter as by the direct action of the fire.

The only advantages which steam pans possess are: first, that the boiling can be stopped or discontinued instantaneously; second, the temperature can be kept up at an uniform degree, whereby the sirup is less overheated; nevertheless, the sugar produced with this kind of combination of open kettles and open steam pans, is not much better than such made in open kettles altogether; besides these pans are liable to get out of order, and cause often great delay at a time when every moment is of great importance to the sugar planters.

The steam pans either heated with the worm or the improved Pequeur's plan, are very useful for defecation of the juice. I saw them at Mr. Wilkinson's plantation advantageously employed for that purpose.

Mr. Alfred Stillman of New York invented an apparatus for boiling sugar in open kettles and open steam pans, of which I annexed an abstract of the specification, illustrated with a sectional view of the apparatus.

A. Stillman obtained letters patent for an improvement in evaporating saccharine juices, dated 17th August, 1843.

The invention consists in placing between the usual "train" of "coppers" or "kettles" the chimney steam boiler, which shall employ the surplus or waste heat from the "train" in generating steam for grinding cane, pumping, or any other purpose for which it may be required.

To supply the deficiency of evaporating power occasioned by diminishing the train of kettles, he substitutes in their place any number of *steam evaporators or clarifiers*, into which is introduced *the "exhaust" or waste steam* from the steam engine. This waste steam to be made effective must be introduced into the clarifiers or evaporators under a pressure greater than that of the atmosphere, and the effect will be in proportion to the pressure.

The objects of this arrangement are, a saving of fuel and improvement in the quality of the product, and the improvement in the latter respect will be proportionate to that amount of the process of clarifying and evaporating which is transferred from the ordinary kettles in contact with the fire, to those making use of the waste steam.

Fig. 49 is a section of the sugar works, in which are shown the application of the improvement, and respecting only a general arrangement. A A are the steam boilers so placed as to receive under them the waste heat from the train. B, the steam engine. E, pump for bringing the liquor from the reservoir to the clarifiers through the pipe F. This pump is not an essential fixture, as the mill is more frequently elevated to a height sufficiently for the liquor to run directly to the clarifiers. G G, the clarifiers; H, the evaporator, which is of the same form and construction as the clarifiers. I, K, L, a train of "coppers" or evaporators, such as are in common use. M, fire place for the train. N, the flue, through which the flame passes from the "train" under the steam boilers to the chimney. O, P, is also a flue to the chimney, so that the flame from the "train" may be turned off from the steam boilers at will. R, exhaust steam pipe from the engine; this pipe communicates with the pipes in the clarifiers or evaporators. S, the escape valve, by which a pressure is maintained in the exhaust pipe.

The clarifiers are rectangular boxes of sheet iron, (boiler plate,) the bottoms of which are double, so as to form a steam chamber, a; around the top they have a channel way (m,) which forms the "skimming spout;" the skimmings, which it receives, are carried off by a pipe. In addition to the heating surface obtained by the double bottom, there is above it, one or more tiers of copper pipes. The method of introducing them is as follows: on two opposite sides of the clarifiers, is a cast iron box riveted, which forms the side chamber (b b,) and extends the whole length of the clarifier; this chamber is closed by a moveable plate which is fastened by bolts; these two opposite chambers are connected by the cross pipes, (c;) the pipes are received into the chambers through "packing joints," so as to prevent any communication between the steam in the chamber and the liquor within the clarifier. To the top of one of the side chambers, there is a cylindrical valve chamber attached, which receives the steam from the exhaust pipe on either side; from the lower side of this valve chamber is a steam passage communicating with the chamber (b;) this steam passage is opened or closed by means of a sliding valve (d.)

When the engine is in operation, the waste steam passing through the exhaust pipe (R) is admitted through into the side chamber (b,) and from thence into the pipes c c, and also through apertures into the bottom chamber, a. The liquor in the clarifier is then exposed to the heating surfaces of the pipes c e, and also of the "false" or "double bottom."

Steam pipes passing through the liquor have been before employed, but not in combination with the double bottom. The advantage of this combination is this: by using the pipes alone, that portion of the liquor beneath them would be in a great measure unaffected, whilst the double bottom above would not give the necessary heating surface; so that the combination is necessary to a perfect operation.

h and i are two valves; one for discharging the clarified or con-

centrated liquor, and the other for discharging the sediment formed in clarifying. Their construction is as follows: the valve is the ordinary "puppet valve," with a hinge on the upper side for attaching the rods; the seat is fitted between the two bottoms of the clarifier and riveted to both; the pipes for carrying the liquor and sediment are attached by flanches and bolts to the bottom of the seats. The valves will close by their own weight, and the weight of the liquor above them will keep them tight; the valves are raised by cords connecting them to levers on the shaft R, which shaft is worked by a handle on the outside of the clarifier.

The valves are so placed that the levers stand in opposite directions, upon the same shaft, so that both valves can never be opened at the same time.

S, the escape valve, made like an ordinary safety valve, (such as used on all steam boilers,) and attached to the exhaust pipe of the engine. Its particular construction, however, is not essential, its purpose being to obtain all the useful effect of the waste steam, by confining it in the exhaust pipe and clarifiers at any required pressure. Suppose, for instance, that the engine is in operation, and the exhaust pipe terminating in the clarifiers, but in some part of the exhaust pipe there is an opening into the air, of a size equal to that of the pipe, the steam, of course, would escape through the opening against the pressure of the atmosphere only; its effect in the clarifiers would then be very slight; but when that opening is closed by means of a loaded valve, (like an ordinary safety valve,) we obtain some effect from the steam, and, by increasing the weight on the valve, we may so confine the waste steam as to effect the entire absorption of its heat in the clarifiers or evaporators, and without materially affecting the power of the engine.

The operation of this apparatus is as follows: The flues N and P being closed by dampers, (at the beginning of a days' work,) a fire is made under the steam boilers at i, (fig. 1,) in the usual manner. As soon as a sufficiency of steam is generated the engine and cane mill are put in operation. The pump E is then put in operation, and the liquor carried to the clarifiers G, G, through the pipe F; the steam is then admitted from the exhaust pipe into the clarifiers; and the liquor having gone through the usual process of clarifying, is discharged by means of the valves (h, h) into the evaporators H, and through that into the train of coppers I, K, L, where the evaporation is to be completed. These coppers or kettles being filled with the clarified liquor, the furnace is closed, and the fire started under the trains of coppers on the furnace M, by which fire, besides effecting the concentration of the liquor in the kettles, the steam is generated in the boilers, and the operation continued.

The steam clarifiers may be used indiscriminately in clarifying or evaporating, as the case may require.

If the train of coppers be very much diminished, more of the evaporation, of course, must be carried on in the steam evaporator.

Alfred Stillman also invented a *steam sugar-pan*, for which he obtained letters patent dated May 16, 1846. The following description is taken from the specification recorded in the United States Patent Office:

"In the evaporating pans, as heretofore made, the main and branch pipes are divided by horizontal partitions, the steam passing into the main pipe below the partition, thence through each of the branch pipes (which are single) below the partitions and around the end thereof, and back over the partitions to the upper division of the main pipe, and thence out—the branch pipes being permanently secured to the main pipes.

"The objections to this mode are various, but the most important are, the great cost of original construction, and the difficulties of repair—both of which are in a great measure obviated by my improvements, which consist, first, in dividing the main pipe by a vertical partition in the middle of its length, in combination with bent crank pipes that connect each with the main pipe on each side of the partition, so that the steam that enters one division of the main pipe, passes into and through the last branch pipes to the other divisions before it passes out.

"Secondly. In connecting the branch pipes with the main pipes by a shoulder and socket joint, which admits of fitting by turning the end of the branch, and brings the face of the main pipes in combination with the mode of securing them air tight by means of screws which pass through the main pipe, and are tapped into tubes, connected with the end of the branch pipes by flanches to admit of the passage of the steam—which mode of adjustment and connection admits of easy adjustment in the original construction, of the easy removal of any of the branch pipes for repairs, cleaning, and of tightening the joints in the event of a leak, by simply turning the screw belonging to the pipe that leaks.

"Thirdly. In connecting the main pipe with the induction and eduction pipes, by means of double packed joints to admit of turning up the branch pipes to clean the pipes and the pan when necessary.

"Figure 50, a, represents a sugar or evaporating pan with a double bottom to form a chamber below for the circulation of steam, in the usual manner. The main circulating steam pipe (c) is connected with the pan and the induction (d) and eduction pipes in such manner as to admit of turning. The ends of the main pipe (e) are turned, and fit in sockets (f f) attached to the sides of the pan, and to the ends of the pipe are fitted short tubes, (g g,) and the joints made steam tight by means of stuffing boxes, (h h',) and the short pipes (g g') are then connected with the induction and eduction pipes by means of the stuffing boxes, (i i',) the induction pipe being provided with a stop cock (k) in the usual manner, and the eduction pipe connected with the bottom of the pan in any desired manner.

"The face of the main pipe, to which the branch pipes (i) are secured, is made flat, and provided with an equal number of holes on each side of the central position, [see dotted line m,] unto

which the ends of the bent branch pipes (l) are fitted, so that each branch pipe communicates with both divisions of the main pipe. The ends of the branch pipes are turned to fit accurately the holes in the main pipe, and they are also provided with flanches that fit the face of the main pipe accurately, and they are then secured by screws (o) that pass through the main pipe and are tapped into tubular nuts in the ends of the branch pipes, and connected with them by rings, (r.) If desired, the flanches (n) and the heads of the screws (o) may be packed to insure air tight joints."

Mapes & Cox patented a pan for evaporating saccharine liquors, 11, dated 7th January, 1846, which consists of "a series of short straight pipes of copper, A, (see section, figure 51,) or other metal, communicating with each end with a metallic box, or tube, B, B', running the whole length of the series: an arrangement which offers the least possible obstruction to the circulation of steam, and permits the pipes, A, to be laid at such an inclination as will insure the immediate running of the condensed water as it forms. Steam is admitted from the boiler, or vessel in which it is generated, into the box, B, with which the raised ends of the pipes communicate, from whence it passes into and fills the pipes and there yields up its heat, which, being transmitted through the copper or material of the pipes, heats or evaporates the fluid surrounding them. The water formed by condensation of the steam flows into the box, B', at the lower ends of the pipes, from whence it is conducted away, either to waste, or into a cistern for resupplying the steam boiler. The pipes are inclined not less than an inch, or three-fourths of an inch in a foot; the inclination being greater as the length of the pipes is greater, as it is important that the water should not be suffered to accumulate in them, owing to the injurious effect it has upon their evaporating power. In order that the condensed water may be got rid of without letting steam escape, there may be connected with the box, B, some one of the many contrivances for this purpose now in use; for example, a vessel in which is a ball-cock so arranged as to let off the water only.

"The pan, D, contains two series of copper pipes, (A, A,) a little less than five feet in length. The bottom of the pan has an inclination from the ends towards the middle of about one inch to the foot; and, as pipes rest upon the bottom, they have a like inclination. Across the middle of the pan is a gutter (*d*) which receives the sirup as it runs down the bottom, and conducts it to the centre, where the discharge valve (E) is placed. The discharge valve is controlled by a lever which permits of its being raised from the outside. The steam boxes (B, B) of both series, connected to one steam pipe (G) in which is a stop-valve (H) for shutting off the steam, and connected with this stop-valve is a pipe leading from the steam boiler. The box (B) is rectangular; one side has openings in it into which the pipes are screwed; the other side is closed by a cap (J—see figure 52.) The cap is also rectangular, and resembles a box having only the top, bottom, and one side, and when in place, looks like a box of smaller dimensions fitted into

the side of one of larger dimensions. The inside of the top and bottom of the box, and the outside of the top and bottom of the cap, are planned to make a better joint: and in planning the box, a rabbit, or shoulder (*b*) is left upon the top and bottom, against which the cap comes. Red lead, or some suitable substance, is put in the joint, and the surfaces are brought together by screw-bolts (*j*) passing through the cap and box. The water box, (B') the form of which is not essential, but for convenience is made semi-eliptical, is cast entirely closed, except the openings into which the pipes screw, and an opening in the under side, and near one end, through which the condensed water is led away.

"The pipes (A) are formed in the usual way, by rounding a piece of copper of the proper width and length, and brazing the edges together.

"The ends of the pipes are drawn in a little, and have brass collars (*a*, *a*) brazed upon them, upon which the screw thread is cut. The end which screws into the water box is so much smaller than the other end, as to permit it to pass through the hole in the steam box, into which the other end fits, and the pipe is screwed into both boxes at the same time.

"The form of the cap, above described, for closing the steam box, is preferable to any other which we have used, for two reasons: it forms a joint impervious to water and steam, and it permits the apparatus to lay close to the bottom of the pan, by which means a small charge of sirup can be boiled. It is an established fact in sugar making, that the less the quantity of juice, or sirup, operated upon, and the shorter the time it is under treatment, the better will be the result both as to quantity and quality."

3. *Open kettles and vacuum pans.*—By this mode of boiling sugar, the cane juice is concentrated in the common kettle, to the density of 29 or 30 degrees Beaumé, and finished in the vacuum pan. Mr. Thomas A. Morgan was the first who introduced a modification of Howard's vacuum pan, to bring the sirup which has been concentrated in open kettles therein to the striking point.

Mr. Morgan kindly offered to furnish me with notes from his careful and extensively kept memorandum books, not only in regard to the boiling of sugar in vacuo, but of all the various operations concerning a plantation. Time, however, would not permit me to avail myself of his kind offer, but I hope another year to obtain some valuable data from this experienced and disinterested planter, who has spent many thousands of dollars in experiments to improve the manufacture of sugar direct from the cane juice.

The vacuum pans used in Louisiana are made of boiler iron, resembling in form and construction locomotive boilers. These vacuum pans are heated with low pressure steam, the sirup is not liable to be burnt, and the sugar is far superior to any made in the modes already described. With the use of animal charcoal filters, sugar of superior quality can be produced. This mode of boiling sugar, however, affords no economy in fuel; and, I believe, requires even more than in the common mode in open kettles; because it needs two furnaces to be heated—one for the open kettles, the other for

the generation of steam to work the air pump and heat the vacuum pan. The vacuum pan which I saw in operation at Mr. T. Morgan's was constructed by Messrs. Morris & Co., of Philadelphia, a beautiful specimen of workmanship; the price I was informed was $2,800.

The arrangement of the pipes in these pans is shown in a longitudinal section through the dotted line x x, figure 53. Figure 54 represents a vertical section of the pan.

4. *Open high pressure steam pans.*—This apparatus consists of a number of pans, wherein the juice and sirup are heated either, by means of a worm, by Pecqueur's or Stillman's plan. The steam is generated in boilers, and conducted to the set of steam pans by a mean steam pipe, from which the steam is carried to every separate pan by a branch pipe. *Mr. Duplessis* obtained letters patent for an apparatus where the saccharine liquid is partly evaporated by pans exposed directly to the steam generated in the steam boiler, and partly by steam pans with double bottoms or jackets, which is more fully described in an extract from the specification, and illustrated by a drawing.

This kind of apparatus has never been used with any success, and whenever they have been employed with some advantage the sugar has seldom turned out to be of a better, but oftener of an inferior, quality to that made in open kettles, and the consumption of fuel is from 25 to 30 per cent. greater than in the usual mode of boiling, owing to the great amount of pipes leading the steam through all the various steam pans, causing a great waste of caloric by radiation. In the mode of boiling in open kettles, the great amount of heat is lost through the chimney; very little is wasted through radiation, as the furnaces are built under ground or surrounded with earth.

Duplessis's mode of boiling sugar, for which he obtained letters patent, dated 16th December, 1846:

Figure 55 is a longitudinal vertical section.

"The methods heretofore practised for evaporating saccharine juice in the manufacture of sugar are setting the series of kettles in a furnace, the flues therefrom passing under them, or making the kettles with double bottoms, into and through which steam is caused to pass by means of pipes from a steam generator. The former of these is very objectionable, on account of the practical difficulty of regulating the temperature to avoid burning the sirup, which of course spoils the sugar; and the latter on account of the waste of heat, and the original cost of construction, the steam being conducted from the generator to the double bottoms of the pans through long pipes, which, together with the outer casing of the kettles, are exposed to the condensing influence of the surrounding atmosphere. To remedy these evils is the great object of my invention, which consists in arranging the whole series of kettles, for evaporating the saccharine juice and sirup, on the top of a steam boiler, with their bottoms, or all that portion of their surface which is to be heated, within the boiler, to be exposed to the direct action of the steam within the boiler; instead of taking

the steam from the generator and conducting it through pipes exposed to the atmosphere; whereby I effect a saving of fuel and room, and avoid the whole expense in the original structure of making the double bottoms of the kettles and the pipes, &c. But simply putting the bottoms of the kettles in the boiler will not suffice, as this arrangement will not enable the attendant to moderate the temperature of any of the kettles, as is frequently required, without affecting the whole series at the same time; and therefore to meet this end I have devised my second invention, which consists simply in providing the boiler with one or more partitions, with a valve in each, so that by the closing of the valve or valves steam may be blown off from that section which heats the kettle or kettles, to be reduced in temperature, thus putting the apparatus wholly under the control of the attendant.

In the accompanying drawings, fig. 55 (A) is the furnace, constructed in accordance with the most approved plans, and (B) the flue leading therefrom to the chimney. The boiler (D) is made with the bottom semi-cylindrical, the sides vertical, and the top nearly flat, and deeper at the front end (D′) than at the rear (D) to make the top incline from front to rear. It is provided with a man hole and a safety valve at each end of the usual construction; and to these must be added supply pumps in the usual manner.

The evaporating kettles (E, E′, E″, E‴) constructed in the usual manner, are let into the top of the boiler, which is pierced with large holes for this purpose, the flanches of the kettles being bolted steam-tight to the top plate of the boiler, which, being inclined from front to rear, gives to the tops of the range or series of kettles the same inclination to facilitate the transfer of the scum from them to a delivery depot (d) at the lower end. The kettles are further surrounded by wood-work (e, e) representing tiling, to form a sloped rim around the kettles to prevent the scum in the boiler from running over. The kettles in the series are of different sizes; the larger at the lower or back end, (D,) and the smaller in the upper or front end, (D′,) the size being gradually reduced from what is called the "grande" to the "batterie," to correspond with the reduced bulk of the sirup as it evaporates from the saccharine juice to the concentrated sirup prepared for granulating.

The saccharine juice is heated preparatory to its introduction into the first of the series of kettles, (E,) by means of pans (F, F, F) arranged back of the boiler and above the level of the kettles, so as to conduct the juice after it is heated by a pipe (G) which communicates with the bottoms of the pans, (F,) by small vertical pipes (g, g, g) provided with valves, (h, h, h,) the stems of which extend up above the top of the pans. Other valves (i, i, i) are adapted to their bottoms for the purpose of cleaning them. These pans are heated by steam conducted from the boiler (A) through the space (k, k, k) between these double bottoms, by means of a steam pipe provided with branch pipes leading to each pan, and each having a cock to shut off or let on the steam. The boiler D is divided in its length into two compartments, by a

vertical partition (H) provided with a valve (n) which may be operated by a stem passing through a stuffing box in the side of the boiler, so that by closing this valve, steam can be blown off from either, and to reduce the temperature under the kettles, when deemed essential by the attendant, and, when sufficiently reduced, the valve may be opened to restore an equilibrium of temperature. In this way the boiling may be regulated with great facility and accuracy. Instead of one partition and valve for four kettles, the number may be increased so as to have one for each kettle; but I deem one for four kettles sufficient for all practical purposes.

William Graham obtained letters patent, 10th March, 1843, *for a steam-boiling apparatus*, of which fig. 56 is a vertical section.

The evaporating kettles A, in which the juice is evaporated, and made of copper, or other suitable material, are of different sizes, and are arranged on different levels—the largest in this arrangement being the highest—the kettles gradually diminishing in size from the kettle termed the grand A' to that which is termed the battery A^4, the upper edge of each kettle being placed nearly on a level with the bottom of the preceding one, and communicating the one with the other by suitable tubes, B, provided with cocks, C, for opening or closing communication from one boiler to the other.

The evaporators A are placed in semi-spherical cast-iron, or other metallic shells or jackets, D, of larger size than the evaporators, so made and arranged as to leave a space, E, between the two, to admit steam from a common boiler by which the evaporators are to be heated, the steam being heated through branch tubes, F, of a main tube, G, leading from the steam boiler; all said tubes being furnished with stop cocks for regulating the admission of the steam, and consequently the degree of heat required. The evaporators are provided with pipes and cocks for letting off the liquid from one to the other. The condensed steam is made to flow back into the boiler constantly by arranging the main steam-pipe immediately beneath the kettles in a position inclining upwards from the boiler, with vertical branch tubes leading into the same from the lower part of the jackets, through which steam is admitted to the spaces between the jackets and kettles, and by which the condensed steam is suffered to flow back into the boiler by its gravity, thereby preventing the evaporation of the steam by keeping it constantly enclosed from the atmosphere.

OPEN HIGH PRESSURE STEAM AND VACUUM PANS.

5. The relative advantage and disadvantage of the open high pressure steam pans, as well as those of the vacuum pans, has been pointed out already. The combination of one of those systems with another produces, in regard to the economy of fuel, no advantage whatever. When the proper care is taken in evaporating the juice in the pans, so as not to overheat and burn it, and when the operation of evaporation in the vacuum pan is carried on with low pressure steam, sugar of good quality can be produced, especially when boneblack is used. The sugar, when properly managed, is equal to any made by the improved modes hereafter described.

The vacuum pan, used in combination with open kettles or high pressure steam pans, have always the advantage, that the planter is enabled to reboil his molasses.

TWO VACUUM PANS.

6. *a*.—This mode of boiling sugar requires a careful defecation and filtration of the juice and sirup through animal charcoal. The cane juice, after having been defecated, is passed through boneblack filters, collected in a vat from which the first vacuum pan is supplied; when the cane juice is concentrated therein to 28° or 29° of Beaumé, or thereabouts, it is drawn off into a vat from whence the concentrated juice is passed again through boneblack filters, collected into a proper vat from which the second vacuum pan is supplied, where it is then brought to the striking point. The vacuum pans used in this mode of boiling are like those described under the mode of boiling in open kettles and vacuum pans; they are heated with low pressure steam, and, consequently, the burning of the concentrated saccharine liquid is thereby obviated. When the operations of defecation, filtering, and boiling, are well managed, the sugar is equal in every respect to any made in any apparatus of the most improved method. I saw at Mr. Williamson's plantation, where two vacuum pans for boiling are used, sugar of an exceedingly light color and beautiful large crystals. By this mode of boiling sugar, the consumption of fuel is as great as with common kettles. These kinds of vacuum pans require a great quantity of fresh water for condensing, which is not difficult to obtain along the banks of the Mississippi and bayous; but, in places where water is scarce, vacuum pans of this description cannot be employed.

b.—Degrand's apparatus.—Degrand's system consists of a condenser. The vapors arising from the juice or sirup boiled in a vacuum pan and condensed by means of a serpentine tube, over which a film of cold juice is continually kept flowing, which absorbs the latent heat of the vapor within the tube, and a portion of the water from the juice passes off as vapor in the air. Degrand's condenser serves the double purpose of a condenser and evaporator.

There are only two of Degrand's apparatus* in Louisiana. One is owned by Mr. Valcour Aimè, the other by Mr. Lapice. They are more commonly known as Dérosne's apparatus; but justice to the inventor compels me to give the apparatus its proper appellation.

In 1846, when at Paris, I had the pleasure of becoming acquainted with Mr. Degrand, the real inventor and patentee of this apparatus, from whom I learnt that Messrs. Dérosne & Cail were only the consructors and assignees of his apparatus for the north of France and all the colonies.

I was informed that the Degrand apparatus, in operation in Louisiana, have vacuum pans with a very large heating surface, and heated with low pressure steam; the air pumps are larger than those used in the Island of Cuba. The artificial draught of air is not

* Constructed by Messrs. Allen, Stiliman, & Co., at the Novelty Works, New York.

made use of here, but the same result is obtained by the injection of water between the condenser and air pump; this increases somewhat the consumption of fuel, but the vacuum obtained in that way is as perfect as by means of the draught of air; and the sugar made with this apparatus is as good as any made in Louisiana.

I have seen this apparatus at work in the beet sugar manufactories in Germany in my last tour through that country; but the manufacturers were beginning to abandon its use, in consequence of the practical difficulties in distributing the beet juice regularly over the serpentine; and in case one of the many tubes which form the serpentine has the slightest deviation from the straight line, the juice will concentrate more at such depressions, and disturb the regular distribution of juice over the tubes. When a leak happens, the juice or sirup is rapidly absorbed into the interior of the tube on account of the vacuum, and causes a considerable loss. It is likewise found that the economy of water for condensing is not so great as was anticipated, and finally it was concluded to return to the former plan of boiling in common vacuum pans.

The consumption of fuel by a Degrand's apparatus is $1\frac{3}{4}$ to 2 cords of wood for every 1,000 pounds of sugar produced. I have been told that in the Island of Cuba this apparatus takes off the whole crop with the bagasse alone; however, some require great quantities of wood besides the bagasse.

Mr. Dérosne obtained a patent in this country, dated in Europe, 1836, and in America, July 10, 1845.

The following description of the mode of working his apparatus, is taken from his patent, on record in the United States Patent Office.

The method of manufacturing is described therein as follows: The juice is expressed from cane, or other material, in a mill of usual construction.

The juice which is taken from the mills is defecated in pans, or boilers, a row of which is shown at f f f, figure 58. In figure 57, the elevation of one of these boilers, f, is represented. The juice from the mill passes into a reservoir, d, that is connected by a pipe (d′) with an air tight cylinder, c, in which pipe there is a stop cock that is turned by a long handle, (d″) by turning which, the cylinder, e, can be filled, and the communication can be afterward cut off by admitting steam from the generators, or boilers, (shown in figure 58, G, in dotted lines, that supplies steam to the engines and heating apparatus of the whole manufactory,) into the top of the cylinder, e. The juice is forced through a pipe, e′, in the bottom of said cylinder, up into the clarifying boilers, f, which is constructed with a double bottom, between which steam is admitted by the tube (a′) from the generator; the condensed water being returned to the boilers by a force pump through the pipe (b′.) The construction is common, and a more particular description is not deemed necessary; but the employment of the series of these pans, for this purpose, has never before been done, or the juice clarified, as about to be described.

When the cane juice has reached the point proper for receiving

the clarifying mixture, which point is from 60° to 63° of Beaumé, it is added. This composition is made by a compound of the sulphate of alumine of the cheapest character, either with or without the presence of iron, which is formed by mixing sulphuric acid with aluminous earth, and adding thereto lime, potash, or other similar salt, and a quantity of liquified blood, either fresh or dried, being incorporated into the precipitate. This is united with the juice by carefully stirring it while pouring in the mixture, and clarifies it; or, instead of this, lime alone can be used, as in my former processes, the quantity being much greater than that used in the old colonial mode of proceeding, as, in this system, there is nothing to fear from an excess of lime, which a subsequent part of the process perfectly corrects to any extent that it may have been found necessary to use it, in order to obtain a good clarification. The steam is kept on until the juice begins to boil, and when this point is reached, the steam is cut off. The result of this is, where the mixture is used, that at the top of the boiler, f, f, a thick and solid coat of scum is formed, and only a very small quantity of matter is precipitated to the bottom of the boiler. In a few minutes the liquor will have become clear, and can be drawn off through a tube, (m,) by turning a cock in the bottom by means of a key, (m′,) when it can be ascertained if the liquor is limpid. A small quantity of thick matter usually issues from the tube first, but it soon runs clear. By this mode of proceeding, we avoid all the troublesome labor of skimming, &c., which is rendered necessary. The juice, after leaving the tube, (m,) passes into a gutter (M) which communicates by a pipe (c) with another reservoir, (j,) by which the filters, hereafter described, are charged with the juice.

When all the clear juice is drawn off, the scum and the remainder is drawn into a reservoir underneath, after which bags are filled with it, and the sirup is drained and pressed out of it. The clarified cane juice in the reservoir F, is next to be filtered through animal charcoal in grain; and this filtration constitutes one of the most important operations of the manufacture—it purifies the juice to a degree hitherto unknown, and furnishes the means for readily obtaining sugar of the first quality. In Fig. 57, eight of these filters are represented, (h, h, h,) all of the same construction; the same are shown in Fig. 58. They are constructed to contain about one and one-seventh tons of animal charcoal. They are made of sheet iron or wood lined with copper, of a square form, narrowing slightly toward the bottom. At the lower part there is a grating, leaving a small space between that and the bottom, through which the filtered liquid flows. On this grating is placed a thick blanket, for the purpose of supporting the charcoal, which should be sufficiently large to allow the edges to be pressed against the sides; a thick layer of charcoal is then spread over this blanket firmly and evenly, after which another layer of charcoal is put on, care being taken to equalize it with a trowel as it is thrown in, and the filter is filled thus to about four and a half feet in depth; the upper surface is then carefully smoothed, and it is ready for use.

A plate is laid on the place where the cock discharges the juice or sirup into the filter, in order that it may spread horizontally over the surface without forming hollows therein. The sirup penetrates the animal charcoal, and drives the air down before it, which is discharged from a pipe that leads up from the space below the grating to the top of the filter. The sirup, after passing through the grating and having deposited all its impurities in the filter above, is drawn off through the cock in the bottom, from whence it is conducted to a reservoir, shown in Fig. 58 by the letter k, from which it is elevated by a cylinder (l) into a reservoir, (l′.) This cylinder or monte-jus is made and operates precisely the same as that above described and shown in fig. 57.

From the reservoir l′ of figure 58, the juice is conveyed to the evaporator, which is one of the most important parts of my invention, and is constructed as follows: Figure 58, (C′ C″ C‴) being a top plan, and figure 57 a side elevation thereof; it consists of a double or triple series of horizontal tubes of 8½ inches in diameter, and about 300 feet in length, each series being placed one over the other, forming two or three parallel lines; the tubes of each series are connected together at each end, so as to form one long conductor for the steam, by which they are heated, as hereafter described. The tubes of each series are supported by two upright posts, one at each end, which are connected at the top by a cross beam or cup brace just under this beam; there is a bracket on the inside of each post, which supports a triangular shaped trough or distributor, (P,) that extends from one to the other, the lower edge of said trough being serrated, without being cut through, and standing directly over the centre of the upper tube of the series, (C′;) one side of this trough has a row of small vertical oblong holes in it, through which the juice received from the reservoir (l′) percolates, and guided by the lower serrated edge, drops upon the top of the upper tube, spreads itself around it, and then falls on the next, and so on to the bottom, passing over the entire surface of the tubes, which, by the heat of the steam within them, serve to evaporate some of the aqueous portions of the juice that is then received at the bottom in a receiver, (t′,) and ultimately into the reservoir, (u,) and the juice being heated by the tubes, and being exposed to the action of the air in a state of extreme division, is evaporated, and conducted in a proportion determined by the rate at which it escapes from the distributor above, as it falls into the receiver (t′.)

A is a pan of a common construction for boiling by steam in vacuum, with the usual fixtures attached hereto, a particular description of which, therefore, is not deemed necessary; a vacuum is formed by an apparatus hereafter named, in the boiler A, and by opening a communication between the boiler and the reservoir (u,) through the connecting pipe (d″,) which extends from the bottom of said reservoir to the pan the juice contained in the reservoir rushes into the pan. As soon as the pan is filled, which is ascertained by means of the glasses in the lid of the pan, the pipe (d″) is stopped, and the steam is introduced into the respective heaters of the boilers from the steam generators.

The steam which rises from the juice in the pan into the cup, (h',) passes through a tube (a) into a large upright cylinder, B, which I denominate a safety vase, and in which any saccharine matter is separated from the steam which has been forced up with it. From the vase B, the steam passes by the pipes (e'') into each series of tubes above described, (lettered C', C'', C''',) entering the upper tubes of the series and passing out of the lower ones on the opposite sides; the steam, in passing through the tube, (C,) is condensed by the juice which runs down over the outside, the apparatus thus performing the two-fold operation of evaporating the juice and forming a condenser for the steam rising from the vacuum pan. The steam, when condensed into water, runs out of the lower tubes, as above named, into an injecting cylinder, D, where, if the condensation is not perfect, water can be injected to complete it; from the cylinder D, the water of condensation, &c., is drawn off by the action of the air pump attached to a steam engine, all of which are of usual construction, and their location is indicated in the drawing by E. The pump and cylinder D, above named, may be omitted, and a ventilator placed in their stead, as will be obvious to any competent mechanic; but the vacuum will not in that case be so complete, although the expense of the apparatus is somewhat reduced. Instead of attaching the condenser with the vacuum pan, as above described, it may be connected with the exhaust pipe of the steam engine.

As the depth of juice in vacuum pan A is reduced by evaporation down to the heaters inside, a further supply is to be admitted from u, through the pipe, (d'',) as in the first instance; and when the juice under evaporation acquires a density of 24° or 25° of Beaumé, it must be drawn out of the pan, the passage of the steam to the heaters being first cut off, and the vacuum therein destroyed.

The sirup at 25° then passes through a moveable spout, L, which is directed into another spout, N, and thence into the reservoir I, after which the boiler is charged with juice from u, and the process again proceeds as before. During the operation of emptying and refilling the pan, the time is so short as not to require the stopping of the flow of the cane juice over the outside of the tubes C', C'', C'''.

From the reservoir I, the sirup is raised, by means of a hand pump, J, into a spout which is represented at i, figure 58, for feeding the filters before described. The sirup runs from the spout i into either of the filters (h) through stop cocks attached thereto for that purpose, and passing down through the filters, as above described, it is soon after drawn off through the cock and received into the gutter, (i',) whence it is conducted into the reservoir k', figure 58, and when there is a sufficient quantity therein to fill the pan A, the other processes are stopped, and the pan A is filled with the sirup from the reservoir k', by means of a pipe, u', which connects them by a proceeding similar to that for filling the pan from the reservoir u. The evaporation of this sirup of 25° is then proceeded with until it is sufficiently boiled, which is ascertained

by the testing rod of common form. When the sirup is in a proper state of condensation, the pan is to be emptied, by means of the moveable spout L, through the spout N, into one or the other of the heating pans shown by letter F.

The pans F have double bottoms, and are supplied with steam from the generators between the two bottoms, by which they are heated, until the temperature of the sirup contained therein reaches 70° Beaumé, at which point crystallization almost immediately commences; and when it is quite determined, the mixture of crystals and sirup must be stirred with a wooden spatula, care being taken to distribute the crystal formed on the bottom and sides equally; the matter is then, while in a liquid state, ready to pour into the moulds.

In the process of filtration, herein-before named, as soon as it is found that from the use of the filter the sirup of 25° comes from it less pure than at first, it is stopped and turned into another filter; the clarified juice is then admitted into the filter from spout (j); this drives the sirup still contained in the filter down, and takes its place. When the degree of the flowing sirup is found to be reduced to 15°, the juice flowing from the cock is directed into the gutter j, which conducts it into the reservoir k, from whence it takes its course as before indicated.

When the animal charcoal is sufficiently exhausted by the filtration of the clarified juice, water is let on to the filter, and assumes the place of the clarified juice in the same way as the juice did the sirup; by this means the greater part of the juice is recovered, the flow being stopped when the degree of the liquid is too weak to be of value.

The coal is then taken out of the filter and conveyed to the revivifier, described in the remarks on animal charcoal, and the filter is again refilled with fresh black.

Dérosne claims as his invention, first, the method of renewing or restoring the animal charcoal, as set forth in the specification and found in the remarks on animal charcoal, by means of the revolving cylinder placed over two fires in the manner specified, by which it is heated gradually to the proper temperature. Second, he claims the employment of a series of horizontal tubes, placed one above another, in the manner described, having a current of steam passing through them, and the cane juice flowing over the exterior surface, by which the steam is condensed and the juice is somewhat concentrated; thus serving the double purpose of condenser and evaporator as before described, said condenser being attached either to the vacuum pan or the exhaust pipe of the steam engine.

In regard to the novelty of this mode of evaporation and condensing, I shall speak in my next report.

The price of a two metre vacuum pan, two condensing evaporators of 23 pipes each, two air pumps of 10 inches diameter, worked by a five horse high pressure engine, without steam boiler, 30,000 francs, (about $5,700;) the complete apparatus delivered in Paris, cost $20,370. It is called the 500 hectolitre appara-

tus, or apparatus of the first magnitude, working 11,004½ imperial gallons of cane juice in twenty-four hours time, with steam from 60 to 75 pounds on the square inch.*

Sr. D. W. Villa Urrutia, of Cuba, ordered in 1843 an apparatus of Degrand, at Dérosne & Cail's, to boil 13,205 imperial gallons (16,000 pounds sugar) in twenty-four hours, which has cost, including steam clarifiers, filters, charcoal reburners, &c., &c., so as to form a complete modern apparatus, delivered at Paris, $32,000.†

c.—Rillieux's apparatus.—Norbert Rillieux, a native of New Orleans, invented an apparatus for boiling sugar in vacuo, in which he uses the latent heat arising from one pan to boil the juice or sirup in succession in another vacuum pan of similar construction. To heat the first pan he uses the escape steam of the steam engine which works the grinding mill; the second, third, or fourth pan, is heated from the vapors arising from the second and third pans.

An air pump produces the necessary vacuum.

Mr. Rillieux obtained letters patent for his invention, dated August 26, 1843, and for improvement in the same, dated 10th December, 1846.

The following description and drawings will give a correct idea of the apparatus, and its mode of working it:

Rillieux's boiling apparatus is composed of three or four pans.

The four pan apparatus.—The cane juice after having passed the clarifiers and filters flows into a vat, from which it is pumped in the first pan, A, through a pipe, a, figure 61, which leads to the back part of that pan, on which pipe there is a stop-cock which is opened or closed by means of a handle (b) placed in front of the apparatus, where the man who manages the apparatus is placed; and, in turning that handle more or less, he can regulate the feeding of that pan, in front of which is a pipe, c, figures 59 and 61, leading the cane juice to the back part of the second pan, B; on that pipe and under the first pan is a stop-cock, worked by the hand d, by which the feeding of the second pan B is regulated; and in the front, on this second pan and below, is another stop-cock, worked by the hand e; from that stop-cock a pipe (e') leads to the back of pan C, to convey the cane juice, now at the density of 15 degrees Beaumé, into said pan; and from this pan a pipe leads to a pump which draws the sirup, now arrived at 28 degrees, from the pan c, and forces it up to the clarifiers E, E. In those clarifiers the sirup is heated up to the boiling point and scummed; from thence it passes through the boneblack filters G, G, whence it goes to a vat, H, figure 60, below, to supply the fourth or strike pan, D.

Now let us follow the steam:

The exhaust steam from the boilers goes through the pipe I, figures 59 and 60, to the first pan, A. Below that is another, K, which brings the direct steam from the boiler and feeds the clar-

* On Sugar Cultivation in Louisiana and Cuba—page 41, first part. London 1848.

† Ibid., page 18, second part.

ifiers F, F, and pumping engine L. At M, figure 60, is a valve which connects the two steam pipes together, and through which any quantity of direct steam wanted, besides the exhaust steam, can be let into the exhaust steam pipe I, for boiling the juice.

The vapors arising from the cane juice of the pan A, are carried down through a pipe, h, (see figures 62 and 63,) and column i, in a cast iron box, o², steam chest k. A part of this steam passes up through the column l to feed the second pan, B, and passes through the horizontal pipe, m, (see figure 61,) and up the column q, to feed the strike pan D.

The vapor arising from the second pan, B, passes through column n and steam chest k', and up through the column o, to boil the pan C. The vapor from C D passes through the columns p, 2, through the horizontal pipe s, and brings the vapor to the condenser s, where it is condensed by means of a jet of water; the vacuum being maintained through the means of an ordinary air pump, T. S is a pipe which connects the pumping engine with the condenser, the third and fourth pan.

The waste water of the first pan, A, comes down through pipe, t, (see figure 63,) into an air tight chest in the bottom plate of the pumping engine, from which the force pump, u, takes it and sends it back to the steam boilers.

The waste water of the second and third pans, which is the condensed water of the vapor arising from the cane juice in the first and second pans, passes through similar stop cocks and pipes, which carry it to the small air pump, U, which forces it up to a vat, where it serves for all the cleansings of the establishment.

Three pan apparatus.—When the three pan apparatus is used, the cane juice is pumped into the first pan, A; from thence to the third, C; the second, marked B, is omitted; whence it is drawn off by the pump to the clarifiers, and the juice follows the same course as in the four pan apparatus, above described.

The exhaust steam, and the direct steam are let in the first pan by means of the valve M, above mentioned, and the vapor arising from this pan feeds the pan, C, and the third pan, D, and the vapor of the second, C, and third, D, goes as in the other apparatus, already described, to the condenser. The waste water of the second, C, and third, D, follows the same course as already described in the four pan apparatus, to the small air pump. As the main part of the boiling in the apparatus is effected by the exhaust steam of the mill engine, the mill must be kept grinding at a uniform speed, and with a continually regular supply of cane; and as the power of the engine is regulated by the difference of pressure between the steam in the boilers and the steam in the exhaust pipe, and, as that difference is regulated by the weight on the valve, M, it follows that, in loading that valve, M, more or less, the different pressure of steam, or what is called the effective pressure of the steam, is adjusted in such a way that the mill will furnish as much cane juice as the apparatus boils—in such a way that the clarifiers, filters, and filtered juice vat are always kept full. The liquid flows from the mill up to the clari-

fiers and down to the filters, with the same speed as it comes from the mill, the cane juice passing out of the aforesaid vat as fast as it comes in, to supply the first pan, and from thence to the second pan, (or third, as the case may be,) when it is brought to the density of 29° Beaumé. A small pump is attached to the engine to take it out of that pan fast enough to keep the sirup at a certain height in it.

The sirup is pumped into one of the clarifiers, E, as high as the jacket reaches; when that clarifier is filled to that point, the rest of the sirup is turned into the other, which is heated by letting in the steam before it is full; when the first clarifier has reached the boiling point, the steam is shut off, the scum removed, and the liquid emptied by the cock W into a trough, and thence down to the filters.

The only operation which the attendants of the pans have to observe is to keep the juice or sirup at the proper level in the first and second pans, and to feed them as well as the third pan in such a way that the sirup be maintained at 29° Beaumé in the second pan, (or third, as the case may be,) by opening or closing the feeding cocks when the sirup runs too thick or too thin, or when the juice is too high or too low, and also to regulate the pressure of the steam by the valve M. It will be observed that there are two sets of clarifiers, E F—one set to boil the sirup, and the other set to defecate the juice as it comes from the mill.

When the stop cocks are regulated, they require a constant watching by the person employed at the pans; but they remain, sometimes, hours without being moved, or the handles require to be moved more than one-eighth of an inch to one or the other side to keep the cane juice at the proper height, and the sirup at its proper density. The cane juice, when it leaves the mill, passes in a constant stream to the clarifier E, from thence to the filters and pans, and returns again to the clarifier F, at sirup of 29° density, and from there it goes through the boneblack filters G G to the vat H, which again supplies the strike pan, and then, at last, the boiling is done by strikes, as the sugar boiler called it.

The juice goes from the first into the second in the three pan apparatus, and from the first to the second, and from the second to the third, in the four pan apparatus; because, in the latter apparatus, there is more vacuum in the second than in the first, and more in the third than in the second; and it is that excess of vacuum which draws the cane juice from one pan into the other.

The waste water of the juice clarifier F F comes through pipe × in the steam chamber of the first pan; on which pipe there is a three way cock, which, when properly turned, sends it directly back to the waste water pipe t of the first pan. The waste water of the two other clarifiers, E E, comes directly to the waste water pipe t of said pan. When the second pan is boiling, the three way cock is turned to bring said waste water from the cane juice clarifier to the steam chamber of the first pan; and all the steam arising from said waste water upwards mixes itself with the exhaust steam, and helps the boiling of said pan; the water flows to

the lower row of pipes through the other end of the pan, and mixes itself with the waste water of said pan, and goes down through the waste water pipe t, mixed with the waste water of the clarifier E E to the closed chest in the bed plate of the pumping engine, from whence the whole is pumped back to the boilers in such a way that all the steam condensed in the jacket of the cane juice and sirup clarifier, and that which has been condensed in the pipe of the first pan, is returned to the boilers. Now, as all the exhaust steam of the mill and pumping engine is used for the boiling of the first pan, it follows that all the steam raised in the boilers, except the small portions which escape from the leak of stuffing boxes or safety valves, is entirely condensed and rendered available for heating the cane juice and sirup in the clarifier, and the whole of the waste water heated to the boiling point, is sent back to the boiler.

In Rillieux's apparatus the use of the latent heat is carried out more perfectly and fully than in any other system known.

The first pan of his apparatus is heated by steam not exceeding a pressure of four to eight lbs. per square inch, and the latent heat of the vapor from this pan is used to evaporate the sirup in the next of the series of pans, and so on. We have seen from the description of this apparatus that he uses an air-pump to form the vacuum, which is worked in connexion with the various other pumps by a separate steam engine, which is placed under the apparatus.

The apparatus is now in use on the plantations of Messrs. White and Truffan, Mr. Lesseps, Messrs. Murphy and Gardanne, Messrs. Chauvin and Levois, Mr. Camile Zeringue, Mr. Theodore J. Packwood, Messrs. Benjamin & Packwood, Messrs. Armant & Brothers, Mr. Kee, Mr. Barrow, Mr. Lambeth, and I was informed that several planters have ordered similar apparatus to be built and set up this year to take off the coming crop.

The Louisiana planters are indebted for the introduction of this apparatus to Theodore Packwood, esq., of Scarsdale; he was the first who adopted this system, and through his untiring zeal the difficulties which occur in the adoption of all new inventions, and in consequence of which many a valuable improvement has been abandoned, have been overcome, and the calculations of the inventor and the expectations of the enlightened planter realized.

Equally deserving for the success of this apparatus are Messrs. Merrick & Town, of Philadelphia, assignees of N. Rillieux's patent; these gentlemen carried the plans of the highly intelligent inventor into execution, and developed in its results its admirable adaptation to the purpose for which it was intended.

The principle of the successive use of latent heat, has been long known and applied for distilling and evaporating, but it has never been applied in connection with vacuum, by which connection only the rapid boiling required for the evaporation of saccharine can be obtained.

This is, therefore, an American invention, which will form a new era in the sugar growing interest of the United States.

I visited several plantations where this apparatus is in operation; I spent many hours in the sugar house of Mr. Th. Packwood, (which is a model of neatness,) in studying its various operations, all of which went on uninterruptedly with great regularity and precision.

Mr. Th. Packwood uses three steamboilers of ordinary size, the fire grate extends only under two of them, the third boiler is heated by a return flue, and this is the only fire employed about the whole sugar house, generating enough steam to work the grinding mill, to heat the defecators, supply the necessary quantity of steam to the boiling apparatus, to work the engine for the air, juice, sirup, and water pumps; making 12,000 lbs. of sugar in 24 hours.

The apparatus is solid and requires very small space, and has a pleasant appearance.

The sugar made with this apparatus is of a beautiful light straw color, of fine large crystal, and free from unpleasant odor, and commanding a good price and ready sale.

At Messrs. White & Truffan's, Myrtle Grove, and Messrs. Benjamin & Packwood, Bellechasse, I saw the four pan apparatus at work. Mr. Benjamin, who is indefatigable in perfecting the manufacture of the sugar, and who employs with great success pneumatic coolers, called tigers, makes fine, white, stamped, loaf and lump sugar direct from the juice.

Professor R. S. McCulloh, in his official report to Congress of the United States, dated March 1st, 1847, gives therein several letters, and the report of the Agricultural and Mechanical Association of Louisiana, which bear high testimony as to the usefulness and perfect success of this improvement in boiling sugar. De Bow's Commercial Review also gives several favorable accounts of Rillieux's apparatus.

I shall endeavor to collect correct and valuable data in regard to the quantity of sugar and molasses made, and the amount of fuel consumed in a given time, also the expenses of keeping this apparatus in repair, the number of persons employed to work it, the prices obtained for sugar made with such apparatus, and ascertain its nature in regard to transportation and keeping; which, when compared with similar data from other systems of boiling practised, will show the advantage and disadvantage of either system.

The price of a Rillieux apparatus varies according to the size; a three pan apparatus sufficiently large to take off a crop of 440 hogsheads of first sugar, cost, including clarifiers, boneblack filters, vat for filtered cane juice and sirup, three boiling pans, pumping engine, cast iron and copper pipes, and all expenses of setting up, comes to $11,000.*

John Benson and Days obtained letters patent for a double effect *apparatus to boil sugar in vacuo*, dated August 1, 1848, of which the following is an extract of the specification, illustrated by figure 64:

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* See De Bow's Commercial Review, p. 292, vol. 5.

The nature of our improvements consist, first, in constructing and combining a series of sugar pans with each other in such a manner that any one of them can be used at pleasure, either as evaporating or concentrating vacuum pan. Second. In the surrounding and enclosing the sugar pans with a metallic casing, leaving an interstitial space between the two communicating with an aperture in the top of the sugar pan, the object of which will be hereinafter set forth. Third. Our improvements consist in the arrangement of the steam pipes in the sugar pans in independent series of two or more, for the purpose of regulating and graduating the amount and position of the heating surface, as the condition and quality of the concentrating syrup may require. And fourth, in the exhausting the aqueous vapor from the vacuum pan through a pipe passing from the space between the pan and casing into the evaporating pan, where, after coiling a number of times around near the top of the same, it passes out through the sides of the pan and casing to the air pump. The object of carrying the aqueous vapor from the vacuum pan through the evaporating pan is, that it may subserve the purpose of an evaporating pipe—a portion of heat being extracted from the same by pumping a quantity of sirup from the bottom of the evaporating pan to the top into a perforated trough, (L,) through which it drips on to the spiral exhaust pipe. The object of enclosing the sugar pans within an external casing is, to form a space between them to receive the aqueous vapor from the pans, and protect the pans from the cooling influence of the atmosphere; thereby preventing the condensation of the vapor on the upper surface of the pans, and facilitating its condensation after its passage into the space between the pan and casing, by the large surface exposed to the action of the atmosphere.

In the old style of vacuum pan, it has been found that from thirty to forty per cent. of the aqueous vapor is condensed upon the sides and top of the pan, and is thrown back into a liquid form to be re-vaporized, causing a proportionate loss of time, fuel and labor.

In the accompanying drawings, figure 64, is a vertical section of an evaporating and a vacuum pan, as they are fitted up for plantation use; any number may be combined that may be required.

A is the evaporator; B is the concentrator, or vacuum pan; K, K, are the casings enclosing the pans A and B; C, steam pipe for heating and evaporating sirup to a point prior to the concentrating point; D, pipe to complete the evaporation and bring the sirup to concentrating point; E, E, flanges to connect the evaporating pipes with the main steam pipe; F, F, flanges to connect evaporating pipes with waste pipe; G, exhaust pipe for vacuum pan, (B;) H, flange to connect G with the air pump; I, pipe, with stop cock, connecting the spaces M, M, between the pans A and B and their casings; by opening this connection between the two, the evaporating pan A can at any time be converted into a vacuum (or concentrating) pan; J, small pump for pumping the sirup from the bottom of the evaporating pan A into the distributing trough or cylinder L, at the top of the same, through the pipe P.

The aqueous vapor rising from the sirup and filling the space between the pans and casings, preserves a uniform temperature of the surface of the pans, and is rapidly condensed by coming in contact with the casings, and is drawn off from the bottom of the space M by the air pump. The evaporating pipes in the vacuum pans, and in those pans intended to be used either for evaporating or vacuum pans, should be divided into series of two, three or more, arranged one above another, each having an independent connection with the main steam pipe, for the purpose of graduating and regulating the amount and position of the heating surface to suit the condition of the concentrating sirup at the bottom, middle and upper portions thereof; when the sirup at the bottom of the pan is brought nearly to the concentrating point, the steam is shut off the lower series of evaporating pipes, and so also of the remaining series of evaporating pipes to the top of the sirup, until it is all brought to the concentrating point. By this arrangement of independent series of evaporating pipes in sugar pans, it will be perceived that we avoid all agitation of the sirup that has been brought to the concentrating point.

The original cost of our improved sugar pans will be fifty per cent. less than the pans in ordinary use, and but a trifle more than the common iron pan.

Potting sugar.—Joseph Hurd obtained a patent for machinery effecting *the separation of molasses from sugar*, dated October, 1844; the following description is collected from the specification on record in the United States Patent Office.

The process of potting sugar, or freeing it from sirup or treacle, (molasses,) as practised in the West Indies and other countries, consists in allowing it to stand for a considerable period of time in hogsheads, casks, or cisterns, having holes bored through their bottoms. The force of gravity causes the sirup or treacle gradually to descend through the sugar, and escape through the holes in the bottom of the hogsheads.

In order, by the above operation, to expel the sirup or liquid sufficiently to render the sugar fit for market, much time is necessarily consumed. Besides, large curing houses, as they are termed, adapted for the purpose must be erected and maintained. My improvement consists in effecting the separation of molasses, by a machine of a peculiar construction, which accomplishes the same through the agency of *centrifugal force*.

It consists of a cylindric or other proper shaped cistern, surrounding and having within it another cylindric or other suitably shaped vessel, B, as shown in figure 65, which is attached to or has a vertical shaft, c, passing through its axis or central part, and so arranged in bearings and in other respects, as to be capable of being revolved on its axis, and thereby impart a corresponding motion to the vessel B. As a convenient and simple mode of making it, I construct it of a circular and solid bottom, (of wood or other proper material,) and having raised upon it a cylindric wire frame work, b, formed of strong wire or strips of metal wound in a helix, and secured in *such a form* by any suitable number of vertical wires, or rods, or stips, e, c, &c., inserted and confined in the plate

or bottom a, and a metallic ring or rim d, the latter of which is connected to the central shaft c, by arms. The frame work b surrounds and is intended to give support to a hollow cylinder, f, of wound wire, whose inner surface is lined with flannel or other suitable material, the object of the whole being to suffer the escape of the sirup, molasses, or liquid matters through the sides of the vessel B, and at the same to retain the sugar within it, whenever the vessel is put in rapid revolution.

The said vessel may be revolved within the cistern by means of a pulley, h, fixed on the top of the shaft, around which (pulley) a band from the driving power may extend and give motion to it.

The sugar containing the molasses is to be thrown into the interior of the vessel B, and when the said vessel is put in rapid revolution, the centrifugal force generated in the molasses, or sirup, or liquid matter, will expel it from the mass of sugar, and drive it through the sides of the chamber B, into the cistern surrounding the said chamber, from which it may be removed through an opening or faucet.

Such a machine is so effectual in discharging molasses, sirup, or other liquid matters from sugar or other powdered or pulverized substance, that but a short time is required to effect by it what requires a very long period by the old process herein above detailed. Although I have described such a machine as my own practical experience has proved to be of the simplest and most convenient kind, for the purpose for which I have used it, yet others, varied in form and construction, may be made to operate in a similar manner, so as to expel the sirup, molasses, or other liquid, from the sugar or other matter containing the same.

I also use the said machine for *washing* sugar or other matter, and this I effect by gradually pouring or discharging water or other cleansing liquid upon or near the centre or other suitable parts of the mass of sugar, or other material contained in the cylinder vessel B, while the said vessel is in rapid revolution. The water or cleansing liquid will thus be driven through the mass and sides of the vessel by the action of centrifugal force.

John De Bretton obtained letters patent, dated 24th May, 1845, for an improved method *of clarifying, draining, and graining sugar.* The following description is an extract of his specification relating to draining, &c.:

"When the sugar is fit to be potted, five copper pipes or tubes, a, a, a, a, a, figure 66, perforated with small holes an inch apart, are placed perpendicularly in holes in the bottom of the hogsheads. The tubes are made in a conical form, hollow inside; the diameter on top is to be two inches, tapering down to three quarters of an inch diameter at the end. (See figure 67.) The hogshead is then filled about one-third full of sugar, or if ten hogsheads are to be potted, you will fill them all, as said above, one-third full, and then commence throwing on each with a watering pot one-half gallon of strong rum, which is called a wash, and is for the purpose of dissolving and carrying off the molasses; then put on another layer of sugar on the first hogshead, and so on in rotation,

as mentioned in the first instance, and again wash with a half gallon more of rum; after which the last third of the sugar is potted in each and every one of the hogsheads, and the same quantity of rum is applied, so that each hogshead receives one and a half gallons of rum when entirely filled.

"The pipes placed in the hogshead are to be turned frequently round after they have been in twelve hours. In the said pipes, an iron or wooden rod, small enough to go through them, is used for the purpose of clearing away any obstruction that may be caused by the rapid flowing of the molasses, which ought to be done three or four times in the first twenty-four hours. After forty-eight hours have elapsed, the pipes are removed to be used in other hogsheads, and are replaced by wooden sticks large enough to fill the space made by the pipes that are introduced into the vacant holes in the sugar; these are kept there until the sugar in the hogshead is found to be sufficiently drained; they are then taken away; but care must be taken to have these curing holes kept open, to admit of the molasses draining as much as possible, until the sugar is fit for market."

I saw these pipes in use on several plantations, and they consider them a great improvement in draining the sugar in hogsheads.

The following is inserted to guard against the use of poisonous substances in the manufacture of sugars:

PATENT OFFICE, *February* 19, 1849.

SIR: Your application for letters patent for a process for the manufacture of sugars has been examined and rejected for want of novelty. You claim the combination of sulphurous acid with lead in the manufacture and refining of sugar. Combining sulphurous acid with oxide of leads forms the well known salt called sulphate of lead, which is known to be insoluble in water and in solutions of sugar in water. Hence, it was known beforehand that sulphurous acid presented to a solution of a soluble salt of lead would precipitate the sulphite of lead.—See Rose's Analysis, vol. 1, page 211.

The office takes the ground that the spirit of the invention consists in the use of the sulphurous acid to precipitate all of the lead from the solution; as such fact was known, it cannot now be claimed as new.

There is another ground or reason why the office should not grant letters patent in this case. It is in the fact of the want of security to the public against accidents from the use of poisonous materials in the manufacture of sugars.

Yours, respectfully,

EDMUND BURKE.

Mr. JNO. SCOFFERN,
Care of P. H. Watson, Present.

Charles De Manoël and E. Brafin, both of the island of Martinique, in the territory of the kingdom of France, have invented new improvements in the manufacture of sugar from cane, which was patented in the United States, dated 22d February, 1848.

The nature of the invention consists in drying and pulverizing sugar cane, and then washing the saccharine matter therefrom, to be manufactured into sugar, by evaporation in the ordinary way.

The cane is first cut by a cane cutter in pieces of small size, after which it is dried in a proper stove or kiln; and then it is pulverized in a mill, which fits it for the process about to be described.

A series of any number of tubs or vats are placed in line together; above these tubs a reservoir of water is placed, from which a pipe descends to a level with the bottom of the tubs, and then runs along horizontally below them all; this pipe is connected with each of the tubs by a short branch pipe, in each of which there is a stop cock, which, when open, connects the tub with the pipe; this pipe is also furnished with a stop cock for closing all communication with the tubs.

The top of the first tub has a small metal box on the top that opens into it, from which a pipe descends to the bottom of the second tub, where it connects with it, after passing the water through a perforated plate. The second tub connects with the third in a similar way, as do all the others with those next succeeding; thus connecting the whole. To each of the pipes there is a stop cock, so as to cut off either of the tubs from the series. From the last tub a pipe is attached to its top in the same relative position as those before named, and runs back to the bottom of the first tub, with which it is connected, and to it is attached a stop cock. Another pipe runs along the top of the tubs, which connect by short lateral pipes, furnished with stop cocks, by which either of the tubs can be connected or disconnected with it; this pipe leads to the filterers, when they are used; and otherwise, to the reservoir direct.

Besides the above described pipes, each of the tubs is furnished with a trap door or man hole at the top, and a similar one on the side near the bottom, through which the pulverized cane is received and discharged.

A railway is situated over the tubs, and on it a small car traverses over the tubs; below which car there is a funnel or spout that serves to direct the pulverized cane from the car into the tubs. Another car runs along on a railway just below the bottom of the tubs, and in a position to receive the contents of the tubs when they are to be emptied.

The operation of this apparatus is as follows: The car on the railway above the tubs is filled with the dry pulverized sugar cane, and then brought over the tub in which the cane is to be deposited; the bottom of the car is then opened and its contents fall down through the hopper into the tub below, which, when filled with the cane is closed by the door, and after the whole series is thus filled in like manner, the water in the reservoir is let into the first tub through the pipe, by opening the stop cocks; the

water which is first let into the bottom of this tub rises until the tub is filled, it then escapes through the box into the pipe which conveys it to the bottom of the second tub, partially saturated with the saccharine matter contained in the cane through which it has passed; it then runs through the second tube in the same way, and then through the others till it has received a sufficient degree of saturation, (say about 20° or 25° of the areometer of Baumé,) and which generally reaches 20° at the fifth tub; the stop cock is then opened and permits the water thus saturated with sugar to pass through the pipe into one of the two filterers, or into the reservoir direct; it is then taken to the kettles or battery direct, and boiled. [This kettle is not shown in the drawing.]

A tube of glass is inserted into the box of each tub, into which the areometer can be placed; by opening the stop cock the saturated water is admitted into this tube, the cock is then stopped and the degree of saturation ascertained, after which it is drawn off through a small faucet.

When the saccharine matter is all drawn from the cane in the first tub, the areometer will descend to zero, and it is no longer necessary to let the water pass through it; the cocks are, therefore, closed above and below, so as to cut off this tub from the series, and the corresponding stop cocks of the second tub are opened, a new tub being also added at the opposite end of the series; and after the second tub is exhausted, that is cut off, and so on through them all, retaining the same number at all times in the series, and when one tub is exhausted and cut off, another is added through which the water has to pass.

After the first tub is exhausted, without suspending the operation of saturating the water that continues to pass through the apparatus, it is cut off as before stated, and the exhausted cane contained therein, is removed by opening the door and drawing it out in the car which is on the railway below; the tub is then again filled from the car above.

When the last tub of the series is reached, the stop cock is opened and a communication established through the pipe, between it and the first one, which has been filled with the fresh cane, and the operation is thus continued.

The tubs and pipes are made of any suitable material, and of any proportions found most convenient; their number, also, is immaterial, if there are enough to give the requisite saturization to the water.

APPENDIX No. 3.

CIRCULAR.

PATENT OFFICE, 1848.

SIR: In reply to the circular of queries annexed, I am desirous to obtain the estimated per centage of increase or decrease of crops of this current year, as compared with those of the year 1847. Should you be unable to form the estimates and transmit the replies requested, will you do me the favor to hand this circular to some one who may be able and willing to furnish me the desired information.

Among other useful topics on which I wish to collect information, are the following:

Names and date of formation of the county or township agricultural society, farmers' club, if any, presidents and secretary, with post office address.

Number of members, amount paid for premium, funds, &c.

Names, date of formation, number of members, funds, amount of premiums, &c., of other industrial associations.

State of the weather at the planting season, while growing, and at harvest; and when practicable, the mean temperature for the months, and amount of rain which fell.

Prevalence of blight or insects, probable per centage of loss by them, &c.

Cost per bushel of raising wheat, Indian corn, &c.

Probable average consumption per individual of wheat, &c., Indian corn, potatoes, beef, &c.

Please to send to me the various returns by mail as early as the 1st of December next.

Any valuable seeds, also, will be very acceptable for distribution at this office.

Respectfully, yours, &c.,

EDMUND BURKE,
Commissioner of Patents.

COMPARED

		Per ct. + or —	Cause.	Time of sowing or planting.	Average bush. or lbs. of seed per acre.	Time of harvest.
Wheat,	bushels.					
Barley,	"					
Oats,	"					
Rye,	"					
Buckwheat,	"					
Indian corn,	"					
Potatoes,	sweet or common "					
Hay,	tons.					
Hemp or flax,	"					
Tobacco,	lbs.					
Cotton,	"					
Rice,	"					
Silk, (cocoons)	"					
Sugar,	"					

Cornstalk and straw fodder, proportion of, to grain, value of per ton,

Probable proportion of cultivated to uncultivated land, per, ct.

Most approved rotation of crops,

Root crops, bushels, average aereable product, Beets,

Pod fruits, " " " " Peas,

New products, and value, Madder, amount and value, Broom corn,

Orchard, increase or decrease of attention, Apples,

Small fruit, " " " Strawberries,

Dairy, butter and cheese advance or decline, Butter, price of

Raising stock, advance or decline of products, Horses, No. and value,

Sheep, " " " No. and value,

Hogs, " " " average number to a family, and value,

Poultry and eggs, " " Fowls, average number per family,

Bees, " " Honey, average lbs, per hive,

Manures, new improvements,

Wages of labor, designating particularly those of agricutural labo

Price of transportation to markets

WITH 1847.

Average bush., lbs., or tons per acre raised.	Kinds most successful.	Best soil.	Average per ct. consumed where raised.	Price.

Disease and remedy.

value per bushel, Carrots, value per bushel, Turnips, value per bushel.

value per bushel, Beans, value per bushel,

amount and value,

value per bushel, Peaches, value per bushel.

value per quart, Grapes, value per lb.

Cheese, price of Improvements,

Cattle, &c., No. and value, Beef, price of per lb. Skins, price of

Wool, probable average lbs, per sheep, price per lb. Mutton, price of per lb. Skins, price of per lb. or piece.

average weight. Live weight, price per lb. Pork, price per pound.

price, Eggs, average number of per season, price of, per doz.

price per lb.

rers, of mechanics, and of female domestics.

Foxcroft, Piscataquis County, Maine,
November 20, 1848.

It is with pleasure that I proceed to make a partial report of matters relating to the agricultural interests of this vicinity.

Having had the object of your circular in view through the summer and autumn, and my duties calling me to various parts of the county at periods during the season, I have availed myself of every opportunity, by extensive personal observation, as well as by numerous estimates of intelligent individuals on single subjects, to be prepared to answer on as many points as practicable.

I have encountered so many difficulties at every step of my inquiries as to really preclude the hope of succeeding, with even an approximation to correctness on a single point, to render a return of any particular value in the vast statistics of the nation. These difficulties arise from our position and its attendant effects. Located on and north of the 45th parallel of latitude, at great elevation above tide water, our county did not present to the early Atlantic colonies that attraction which they saw in the more genial climes of the west. Our settlements date entirely with the present century. Extending, as we do, into the cold timber regions of the upper St. John's, the Penobscot and the Kennebec, the agricultural portion of our county is at present found in a narrow border on our southern boundary. But we are pleased to see our borders extending—goodly increase of population, great extension of cultivated lands, with rapid improvement in their general appearance, excellent roads, and universal education.

To proceed in detail with our inquiries, we will consider them briefly, in the order of the circular.

Wheat.—Twenty years since, our lands produced a fine crop of spring wheat with as much certainty as we looked for a crop of hay. But this has sadly changed. Numerous enemies have sprung up, amongst which, mildew, and rust, and the weevil are the greatest, till the raising of a field of wheat is viewed as an experiment. A majority of our farmers have abandoned the trial entirely. Others have sowed the past season from one to four or six acres, and we can hardly say *with varied success*, it is so near a total failure.

The kind most sown, heretofore, is a bald white chaff variety, known here as the *tea wheat*. Of this kind, I feel sure that not so many bushels will be threshed as were sown. Another variety—a *bearded red chaff*—succeeded a little better. I sowed two bushels of each kind, one bushel to an acre, and on each acre one or two pecks of flax seed. Of the bearded variety I have a fair mixed crop—the wheat as good as I have seen for the season.

The bald wheat produced but little, but the flax seed is abundant. But little of either is yet threshed.

I think the flax had a favorable influence on the wheat.

Farmers generally delayed sowing till the last week of May and the first days of June, to avoid the weevil.

Harvesting the last of August. The per centage I send you in the circular.

Barley.—But little has ever been sown here. I have tried it with flax, as practised in New York with good success. Not enough raised worthy of naming.

Oats.—Large quantities are raised since the failure of the potato crop.

Most of our largest farmers give much of their tillage land to a mixed crop of peas and oats—one-half peas. They are raised with less labor than corn, and the surplus finds a ready market with the lumbermens' teams, it being preferred to corn meal.

Buckwheat would succeed well, but the only piece I have seen during the season was a small one on my own farm.

Indian Corn.—This crop is much larger than usual. The fine crop of 1847 induced every one to prepare an extra acre or two, which more than doubled the land usually cultivated.

The crop, however, is not so sound as in '47. The weather was wet and cold in May; the same in June, and wet continually after through the season.

The warm weather in July and a part of August did not suffice to mature the general crop, and the cold nights of September took it unprepared. Well tilled fields gave a good yield.

Potatoes.—The crop is extremely light; less rot, perhaps, than in '47; but the rust cut them early, and we found them *small potatoes, and few in the hill.*

Hay.—We have had three fine crops in succession. The yield about one ton per acre. Our land in good condition, two tons per acre. A large quantity is required for the lumber business, but prices have declined, and the last year ranged from $5 to $8 per ton loose.

Hemp and flax.—Less attention seems to be paid to these crops now than formerly. A piece is now rarely seen.

Silk.—Very little attention is given to this culture; but two or three individuals have given it a trial. It doubtless would succeed well with suitable attention.

Sugar.—This county abounds in the sugar maple; but, for the last four years, the returns have not met the expenses of its manufacture. I keep my buckets and fixtures in working order; but find it cheaper to buy than to make our sugar. None made worth estimating.

Our oldest and best towns are probably one-third cleared of wood.

Our farmers are hardly settled on a system of rotation of crops. We are yet too new to have our attention, from necessity, directed to the matters of exhaustion and renovation of lands.

Root crop.—Since the failure of potatoes, there is an increased attention given to the culture of beets and carrots. Turnips yield abundantly, but seem to be not much valued. The root culture is fairly on the increase. Peas are not much raised, except as a mixed crop with oats. They yield well; average crop, perhaps, thirty bushels per acre, half peas. Beans are raised mostly with

corn. Corn is rarely planted without them. In former years large fields have been planted alone. An over supply has depreciated the price, and this year few have been swon.

A very great crop has been produced, and the price cannot be expected to exceed one dollar per bushel.

The Orchard.—Greatly increasing attention is being given to apple trees; pears, plums, and cherries, also come in for a share of attention.

The State Pomological Society has given an impetus to this business that is doing great good.

We find by trial that most of the valued varieties of apples, known in the northern and eastern States, mature in this county in common seasons.

The trees bear early, retain their vigor to the extent of age that we have yet proved them; and the lateness of our opening spring, and the certainty with which warm weather follows, insures a crop when warmer climates suffer by spring frosts. Our trees have not yet suffered by many maladies that afflict older places.

My experience teaches that a thousand trees here demand less care and labor in tending, than is indispensable to twenty-five in some parts of the older States.

On the raising of stock, sheep, swine, &c., this county stands nearly equal in the quality of these products with other counties of the State; I would gladly pursue this subject further but other engagements forbid.

We had an agricultural society in this county for several years, and last spring it decided to have no fair this year, and I fear it must be classed *with things that were.*

Wages of labor.—Farm help, from $10 to $15 per month, average $12; mechanics from $1 to $1 50 per day; female domestics from $1 to $1 50 per week.

Lumbermen paid last season for men, from $12 to $30 per month; this season wages will average less.

I am, sir, very respectfully, your obedient servant,

CALVIN CHAMBERLAIN,

Hon. Edmund Burke,
Commissioner of Patents.

Foxcroft, Maine, *December* 8, 1848.

Honored Sir: Since making you partial returns to the inquiries in your circular, I have consulted the inventories of three towns, taken by their assessors on the first day of last May, and give you the number of domestic animals therein returned. This embraces, in accordance with our present tax act, "all over six months old."

H. S. Patten, esq., of Dover, has kindly furnished me from the inventory of that town, matters more in detail than I have had time to furnish from other towns, and I here enclose his slip as I received it.

The assessors of the several towns proceed substantially in the same manner to make up their inventories; go from house to house, appraise animals and other property from actual inspection, and at a fair cash value, not too high. In the numbers here returned, we may add for your purpose, the natural increase for the year.

The number of swine wintered the last year was unusually small, and the stock mostly breeding animals.

I think the number has since increased four fold. A very large increase of stock of all kinds is also visible.

We have a larger proportion of village and manufacturing population in Dover and Foxcroft than in the county, making our basis, I think, a safe one.

May, 1848.

Population in 1840.	No. of horses and colts.	Cattle.	Sheep.	Hogs.
Foxcroft, 926	119	747	1,547	126
Dover, 1,597	221	1,302	2,753	237
Atkinson, 704	172	816	2,125	130
County of Piscataquis, 13,138	....	....	....	....
By the above proportion, the number of domestic animals in the county will be	2,085	11,664	26,155	2,003
Add 10 per cent.	208	15 per cent.	40 per cent.	4
	2,293	12,413	36,617	8,012

Which last numbers, I give you as my best approximation to the number of domestic animals in this little north border county. We are but a speck, yet we feel that we make a part of this "great country."

Yours, very sincerely,

CALVIN CHAMBERLAIN.

Hon. Edmund Burke.

REPORT OF WEATHER AND CROPS.

Charlestown, N. H., 1848.

The winter of 1847–'48 was unusually mild and broken, and spring came on early and pleasantly, with abundant rains. But as it advanced into summer, the warmth did not increase in fair proportion until the length of the days; and the rains were frequent and heavy till the end of July. May, June, and July, were, on the whole, unusually cool and moist, though with many pleasant and some warm days. In August, the weather became extremely and steadily hot, and rather dry. This weather lasted till into Sep-

tember, at the end of the first week of which it again became cool and rainy, and has so continued till the first day of October. But as the spring did not grow warm with the approach of summer, so neither has the autumn grown cold with the approach of winter; and October, though cool and cloudy and rainy, has been very free from frost, and its average heat has probably been as great as usual.

In the early part of the season, especially in May and June, there was much high wind. In the latter part of it, the winds were generally light or moderate, except now and then in a storm.

The crop of grass was usually large, and generally got in good condition, though some little portion of it suffered from rain falling on it after being made.

Oats yielded a fair, full crop.

Rye gave a good crop.

Indian corn yielded a very good crop, both in quantity and quality. The earliness of the spring permitted it to be planted in good season, and the great and steady heat in August brought it to perfect maturity.

Wheat is but little cultivated hereabouts, as it is a very uncertain crop. It is believed, from what can be gathered on the subject, that the crop this year was about an average.

Buckwheat did well, and gave a fair crop.

Beans did moderately well; but the crop is not above an average one.

Pumpkins failed almost entirely; partly from the coolness and moisture of the early part of summer, but mostly from the destructive ravages of the large black pumpkin bug, which was this year unusually abundant and voracious. This was also the case with squashes, from the same cause.

Hops, in this vicinity, have given but a small yield this year, though the cultivation of them has been considerably extended within a few years past.

Potatoes have done very poorly. The crop will hardly be half an average one. This does not arise so much from their destruction by rot, though some quantity perished that way, as from a generally unpropitious season, as many pieces, almost entirely free from disease, did not yield 40 bushels to the acre. The rot began to show itself in the first part of August, at the time of the change of the weather from coolish and wet to hot and dry. In the first two or three days of hot weather, the air was very much loaded with warm vapor from the excessive evaporation from the saturated earth; and the black spots began to show themselves upon the leaves; but as no fresh rain fell, and the sky was generally clear, this excessive evaporation soon ceased, and the diseased tops decayed very slowly, so that the stems did not become dry till the end of the month. On one patch, about two rods square, I took off the top of every stem as the blossoms were forming, and but half a dozen blossoms formed afterwards upon this patch. Yet, this was more quickly and intensely affected by the disease than the rest of my potatoes. The tubers were, except in a few cases, but

little affected, even where the tops had entirely perished; and the decay among them was much the greatest where the soil was naturally moist.

Garden vegetables generally did well, with the exception of squashes and cucumbers. Onions were remarkably good. Small garden fruits, as currants and gooseberries, yielded very abundantly. Plums, with the exception of the native Canada plum, were an entire failure. Few trees had any blossoms in the spring, and none of them more than half a dozen. Either the fruit buds did not form in consequence of the coolness and dampness of last September and October, or they were destroyed by the extreme changes of temperature in the winter. From an examination of my trees, I am most inclined to believe in the former state of the case.

Pears also yielded but scantily, and the show of blossoms was less than common.

Apples blossomed fairly; but much fruit dropped off during the cool, wet weather in June, and much was knurly and imperfect, or decayed prematurely, so that the crop was rather small, though not remarkably so.

S. WEBBER.

Commonwealth of Massachusetts,
Methuen, county of Essex, November 20, 1848.

Dear Sir: I have partially answered the queries in your circular, and will further make such remarks as now occur to my mind, having particular reference to this county.

As I said in the circular, wheat is but little cultivated, as it is not considered a profitable crop.

Barley is not extensively cultivated. It is used mostly for fattening swine. This year there is about a medium crop.

Oats are more extensively cultivated. The crop this year better than usual; 50 bushels to the acre is a good crop on land well manured, although we often hear of a much greater crop being raised.

Rye is considerably cultivated, and usually on light, easy land; consequently, light crops are usually the result. About 10 bushels to the acre is considered a medium crop. From 20 to 25 bushels is considered a good crop where the land is well manured, although there has been, this year, a premium awarded by the Essex Agricultural Society for the unusual crop, 44 bushels to the acre. This year there is about a medium crop.

Indian corn is considered a profitable crop, especially on easy land, although the cultivation of it requires considerable labor. A good crop of corn affords a large amount of good fodder for cattle, besides the grain.

Corn can be raised the cheapest on light, easy land, although the crop may not be quite as large as may be raised on hard land, but it requires much less labor; 30 bushels to the acre is a fair crop without manure. Good land, well manured, will produce 60 or 70

bushels to the acre, and sometimes 80 or 90, although that is more than a usual crop. This year, a medium crop. I think corn cannot be raised in the county of Essex, on an average, under seventy-five cents per bushel, although some have set it at much less.

Potatoes are, this year, unusually light—I think about half a usual crop. They have rotted but little. The blight struck them about the first of August, and almost a total failure was anticipated; but the crop was better than was expected. In regard to the cause of the disease I can give no information, although I think those planted early, on dry land, without much manure, have been the most successful.

The crop of hay this season is unusually good—I think about a quarter more than a usual crop. Our best grass lands are cultivated meadow lands, where there is some depth of mud, as they produce greater crops and require less manure. Grass requires a rich, deep soil, that is not excessively dry. Perhaps one ton per acre may be considered an average crop. Good land, well manured, will produce two or three, and sometimes four tons to the acre.

The common practice has been to sow grass seed in the spring with grain; but the young plants are often killed by the summer drought. I think, however, that August is the best time for sowing grass seed, and is now more practised than formerly.

Grass seed should be sowed thick, especially on rich land, as the hay will be finer and of a better quality. From twelve to fifteen quarts of herds grass and three pecks of red top to the acre is not too much for rich land; but less will answer on poorer lands. I think a portion of clover on light land is desirable. I think there is no crop more profitable than hay on lands well adapted to its growth; $12 per ton is now a fair price for hay in market, which is less than it has been for some years.

There is an increased attention to the cultivation of fruit, especially of apples. On suitable land, perhaps, there is nothing more profitable, as they require less labor than most other crops. This year there is rather short of a medium crop. Good apples are worth from $2 to $2 40 per barrel.

There are but few horses and little stock raised in Essex county; they are mostly purchased from the interior of Maine, New Hampshire and Vermont. Stock is now unusually high; common cows are worth from $20 to $25 each—extra ones are worth more. Good oxen $100 a pair, or more.

Dairies, to supply the numerous cities and villages with milk and butter, are considered more profitable than raising stock. Some farmers make it profitable buying cows, not with calf, and other cheap stock in the spring, putting them into good pastures, and selling them to the butcher in the latter part of the summer or early in autumn, before the droves come in from the country, as they get more for them. Fattening beef in the winter is not so profitable as fattening them in the summer, especially to those who have a market near hand for their hay.

There is an increased attention to making manure. The success of the farmer depends much on the quantity he makes. The mer-

chant may as well continue business without capital, or the engine be propelled without steam, as the farmer have good success without manure.

At the present day almost every farmer that builds a new barn digs a cellar under it, and many are digging cellars under their old ones. Thus the value of the manure is greatly increased, as it saves the light as well as the solid; also, prevents its being washed by the rains and dried by the winds. I believe it is a fact that the liquid is worth as much as the solid; and by hauling in mud or some other material, to absorb the liquid and mix the solid, large quantities of manure can be made. Peat mud is one of the finest ingredients for making compost manure; and large quantities are made by mixing it with stable manure, leached ashes, &c.

The cow yard should be lowest in the middle to retain the water and juices of the manure. There should be eave troughs to the barn to carry off the water from the yard. No water should run into the yard; consequently, little will run out.

Guano has been used in some cases with good success; in other cases but little benefit has been derived from it; and I doubt, on the whole, whether it will usually pay the expense. Crushed bone has also been used on some land with good success. Ashes and salt have both been used on some land with equal success; on other land they do no good. I think, however, the best way is to mix them with mud or other materials for compost.

Gypsum does exceedingly well on some of the lands in the north part of Essex county. Pastures that were nearly worthless have been completely renovated, and produce white clover like land highly cultivated and manured; and I think it, on some lands, is exceedingly profitable. I think, however, for renovating our cultivated land, we must depend mostly on stable manure, or compost made of mud or other materials.

The Essex Agricultural Society was formed in 1819. They have an exhibition in September annually, and publish the address delivered on the occasion, reports of committees, statements of the persons who receive the premiums, and other matter, comprising a pamphlet of about one hundred pages. The present officers of the society are: John W. Proctor, esq., of Danvers, president; honorable Allen W. Dodge, of Hamilton, secretary.

Number of members not exactly known—probably about eight or nine hundred.

Amount of funds in 1847..................	$3,572 60
Amount of premiums awarded.............	562 75

The weather the past season was uncommonly wet until about the 10th of July; then we had a few weeks of rather dry weather, which gave a good opportunity for harvesting hay and grain. Since that time we have had seasonable rains, but not excessively wet.

Respectfully yours,

JOSEPH HOW.

Honorable Edmund Burke,
Commissioner of Patents.

Richmond, Mass., *December* 1, 1848.

Dear Sir: The last year has been one, in our climate, $42\frac{1}{2}°$, of some striking peculiarities. The productions of the earth have been seriously affected by the unusual course which nature has pursued in fulfilling her annual routine. October, 1847, was a beautiful autumnal month, highly favorable to the ingathering of the fruits of the earth, and in making such preparations as the season would warrant for causing the earth again to produce in abundance. There were a few light frosts during the month, and a slight fall of snow towards its close, merely enough to whiten the roofs of buildings, and give the hills for a little time a wintry appearance. The morning sun soon dispelled it. The next month throughout was not a "gloomy, sad November;" it was a fine month for business, and many things were done to advance the labors of the field and garden the coming spring.

January, 1848, continued mild until the 9th; and, in some instances, the earth became so dry that *ploughing* was performed. On the 9th, there was a slight fall of snow with a change to colder; 11th mercury fell 19° below 0.13 shade; 14th, fog, and so on, with frequent changes to the end of the month, whose snows in the aggregate would not have furnished tolerable sleighing.

In February, on the first, snow fell eight inches deep; and this storm was succeeded by another on the fifth, making the aggregate depth twenty-one inches, which was considerably whirled about by the playful winds. Twentieth, rain, attended with fog, from which it changed to cool, and remained so to the end of the month; 28th, snow fell five inches deep, and driven about furiously by winds—roads badly drifted.

March possessed a variable character, changing from cold to moderate, and from warm to cold, until the 20th, after which much of its peevishness appeared to be lost in the prospect of spring. On the 18th, blue birds were first seen; 19th, robins; 21st, phebe birds; 29th, frogs first heard.

April opened cool, but not frosty, in consequence of the earth's being but slightly frozen, and the small quantity of snow in comparison with previous years; the ground was early in condition for ploughing, at which all were busy in their several localities by the 10th. It continued dry, and, for the most part, cool, until the 19th, when snow fell to the depth of six inches, and delayed the labor of the farm for two or three days.

Sowing spring crops commenced as early as the fifteenth, and continued through the month.

Stock of all kinds came out in the spring in an unusually fine condition; and, though the crop of hay was less the previous summer, the supply of forage was more than equal to the demand; and it brought no higher price in March and April than it did in November, a circumstance attributable somewhat to the fact that sheep required but little fodder until December, and, in some instances, received none until the middle of the month. Then the *quality* of the small crop hay was excellent. It was gathered with care and

fed with economy. Coarse fodders were also used with unusual prudence, and were eaten readily by animals.

May was a cool, moist month—so wet as in some instances to delay the work of corn planting until near its close, and so cool as to occasion some misgivings as to whether it was best to plant at all. The season was highly favorable to the setting of grass and small grain.

June was too dry for a desirable growth of vegetation, and was subject to many high, cold northwest winds, which operated unfavorably upon all spring grains, especially corn. Its effects upon the potato crop were never recovered.

July came in cool; so much so that frosts were apprehended. We, however, escaped. This and the following month were favorable for sowing the grass and grain crops.

The earliest frost of the season was discovered on the morning of September 13, and slight frosts were noticed for two or three successive mornings. There were not sufficient, however, to injure any but the most delicate plants. On the morning of the 17th, the earth in the vallies was as white as though a sheet of snow had fallen. It appeared that a dense fog arose the previous night, and, ascending into a cold atmosphere, congealed and fell upon the earth in glittering whiteness, most dense in the lowest lands, and diminishing in quantity as the elevation increased. It was remarkable that a frost of so much show should have so little effect. Except in the lowest lands and their immediate vicinity, it was not of sufficient effect to kill the leaves of corn or potatoes, or even the tender leaves of the grape. On the night of the 22d, fell the first snow of the season. Had the surface of the earth been dry and cold enough for its preservation, there would probably have been a depth of four inches; but much melted as it fell, though some of it remained on the highlands until the night of the 23d.

For the mean temperature of the year, together with the amount of rain that fell, I refer you to a following note, kindly furnished by Professor Hopkins, of Williams College. This institution is located in the valley of the Hoosic, in latitude 42° 42′ 49″, longitude 73° 13′. It probably is a fair average of western Massachusetts.

With regard to crops, the best we can do is to make an estimate approximating as near to facts as possible. Perfect accuracy is out of the question in this matter. We have investigated compared opinions, drawn from observing and practical men, and from these draw our inferences.

From the best estimate we can make, the quantity of grain raised in Berkshire, in 1848, will be as follows:

Corn	185,000	bushels.
Wheat	12,000	"
Rye	65,000	"
Barley	8,000	"
Oats	375,000	"
Potatoes	300,000	"
Hay	90,000	tons.

Estimates on stock:

Sheep	95,000—low.
Horses	5,500—high, very.
Neat cattle	35,000 "
Swine	10,000

Butter manufactured	1,200,000 pounds.
Cheese "	2,500,000 "
Honey (worth 12½ cts. per lb.)	12,000 "

Wheat is not cultivated to the extent that its value demands, or the adaptation of the climate and soil to its growth would warrant. There was probably less sown in 1848 than in 1847, from the fact that, in many instances, the cultivator did not realize a harvest to the extent of his *wishes* the previous year.

The number of fields of spring wheat entered on the county agricultural society's books for a premium this year was thirty-one—a greater number than for any previous years; which shows that, on the whole, the crop is receiving more attention. In 1843, its cultivation was considered so unprofitable that the society thought any encouragement in its behalf would be useless, and they struck it from their premium list.

The viewing committee on crops were, however, invited to view one field of wheat, which showed so well in favor of its cultivation that they awarded its grower a premium on their own responsibility, and recommended the crop to the attention of the farmer, and the care of this society. Since then, premiums have been regularly awarded on it; and from that beginning, which would hardly be considered a single *entry*, an increase of thirty fold in number of fields, and a much greater in bushels, has been realized.

We think the increase of wheat harvested this season over 1847 must give an increase of seven per cent. in quantity; and the probable amount harvested in Berkshire would not vary much from ten thousand bushels. The expense of raising an acre of spring wheat, as estimated by a farmer who has always raised more than enough for his family breadstuff, is as follows:

Rent of land worth $50 per acre	$3
1 day ploughing	2
1 " harrowing	2
4 days seeding	2
Harvesting	4
	$13

He applies no manure in the season of raising his wheat, which follows the corn crop, which is well manured, and allows the straw to pay for threshing. But, allow $5 for manure applied the previous year, and it makes his wheat crop cost $18.

His credit stands 20 bushels of wheat, which he considers his lowest average yield, at $1 50 per bushel	$30
Deduct cost of crop	18
And it leaves a balance in favor of wheat, per acre	12

The average produce of wheat the past summer was, probably, not less than twenty bushels per acre; in some instances it ran as high as thirty-three bushels. Time of sowing, from April 10th to 25th. Harvest from 25th of July to 10th of August. Seed sown, from 1¼ to 2 bushels per acre. Barley was sown in about the same quantities as last year. The crop has been good, and is considered profitable.

Oats.—We should estimate an increase from the land sown of from ten to fifteen per cent. The crop is thought to have averaged forty bushels per acre, sometimes going as high as sixty or seventy; they are worth from 37½ to 40 cents per bushel. They were sown at all times, from April 12th to 10th of May; harvested from 20th of July to 20th of August. The usual quantity of seed sown is 2½ and 3 bushels per acre.

Rye.—Probably not more than three-fourths the number of acres sown that there was in 1846, but a large harvest gathered. The crop was very fine. Many of the fields entered for premiums were estimated at thirty bushels per acre. The time of sowing depends on locality. In our clayey loams it should be sown by the middle of August; on warm light lands, from the 1st to the 10th, and some sown as late as the 20th of September. The expense of raising an acre of rye depends on the soil. If the soil is light and friable it can be raised for nine dollars per acre. If a stiff soil, more labor must be bestowed and the expense increased. The quantity of seed necessary where exposed to frost killing, is 1½ bushels; on light lands, from 1 to 1½ bushels; time of harvest from 15th to 25th of July. The crop in Berkshire this year may be set at 375,000 bushels, worth 75 cents per bushel.

The corn crop.—This we consider an important crop in our New England husbandry, and our farmers are growing firm in the same opinion. It is a fattening crop in every position it can be placed. The very process necessary to insure its success is fattening to the soil, so that is better when the crop is taken off than when planted.

The ground must be enriched for its benefit, if it is not already in good condition; it must be thoroughly pulverized to a good and sufficient depth, to enable it to throw its wandering roots abroad; and on these two operations hang the laws of good husbandry.

The expense of raising an acre of corn may be estimated:

To interest on land	$3 00
Ploughing	2 00
Harrowing	2 00
Manure, and hauling the same, a portion of which goes to future crops	15 00
Planting, including seed	2 00

Two hoeings or cleansing with cultivator	$4 00
Harvesting	4 00
	32 00

Such land and such labor bestowed will give at a moderate calculation fifty bushels per acre, probably more.

Fifty bushels at 75 cents per bushel, amounts to	$37 50
Stalks, if well secured, are worth	6 00
	43 50
Deduct	32 00
Leaving a balance of	11 50

for crops, and the land in fine condition for wheat, to be followed by grass. But the great proportion of land is not so valuable, and on most of the crops the expense in cultivation is enhanced; nor will the crop as a whole come up to the estimate. The last season, forty-five bushels per acre may be considered a fair average. We have seen no poor corn. It all ripened thoroughly, and many crops exceeded sixty bushels per acre, while some few (if reports are true) rose as high as one hundred. The kind cultivated are Dutton, a twelve rowed variety, and the Sioux, &c. Indeed, we have many varieties; but they are mostly of the *golden ear*. Very little white corn is cultivated. The time of planting is as soon as the season and the getting in of smaller grains will permit. Last spring, many farmers planted in April, and from that to the 20th of May, the labor being retarded in the latter month by storms. Corn was *ripe* universally by 15th of September.

It is desirable in our New England climate to plant as early as possible; for, though cold weather may retard its early growth, early planted will ripen earliest.

Buckwheat is among the crops of which our farmers sow, from year to year, since they have got in the habit of raising it, about a usual quantity of land. The crop filled well the last season, and averaged about twenty bushels per acre, worth 50 cents per bushel. Sown from June 20 to July 1; harvested early in September.

Potatoes.—It seems as though farmers had resolved to "keep trying" this crop, notwithstanding the sickening failures of past years. Many planted very early, thinking thereby to escape the disease of former years, and others planted, in point of time, as though no disease was apprehended. The crop suffered from dry weather in June; but the loss from rot in Berkshire has not, we think, been over two per cent. on the whole crop. The cause of the disappearance of this plague, we cannot give; our season, however, has differed from those of three or four preceding years. Thunder showers have been much more frequent and powerful; the general temperature has been cooler; but we formerly raised potatoes in warm summers. The earth has been of a more uniform

moisture, and fogs from malignant morasses less common. Whether any or all of these have produced the good effect, we know not; but we think that the purifying influence of electricity has given this disease a shock. Can any one bring reasons to prove our conjecture incorrect?

In consequence of the dryness of June, there was not that number of potatoes in the hill which is usual; consequently the crop was not heavy. They grew to a fine size, however, and were of a superior quality. Their yield may be put at from 100 to 150 bushels per acre, and they were worth at home from 37½ to 50 cents per bushel. The kinds known as Mercer and the Carters bear the highest prices, give the smallest yields, and are most subject to the rot. The "flesh colored" and orange are more hardy, and on all accounts most worthy of cultivation.

The quantity of seed planted varies from 20 to 30 bushels per acre. The increase of crop over last year, 6 or 7 per cent.

Hay.—In 1847, the hay crop was a short one compared with the average crop. In 1848, it was an improvement over that of the previous year, of from 25 to 33 per cent., owing in part to new stocked meadows and the favorable weather in May, which was cold and wet.

Present price of hay, $8 per ton. Average produce per acre probably about 1¼ tons.

Sugar.—The towns in which the maple flourishes have formerly received a handsome revenue from its richness: In the single town of Sandersfield, 143,000 lbs. of maple sugar have been manufactured in a year; and in the county, a probable aggregate of 500,000 pounds, worth from 8 to 12½ cents per pound, in small cakes manufactured expressly for the retail market. In many instances, it is clarified, grained, and made equal to the richest product of the cane. Last spring was unfavorable to its manufacture, in consequence of the ground being so slightly frozen, and the run of sap so short. Probably 200,000 pounds would give the full amount.

Flax receives but little attention.

Cornstalk and straw fodder.—Cornstalks, well secured and cut fine, furnish an agreeable and healthy food for horses and neat cattle; for the latter, if, when cut, they are scalded by pouring on warm water, are almost equal to what they are when green, especially for cows, causing them to produce milk of almost the richness of June. They are worth, when well cured, $6 per ton, when hay is worth $10. Straw is worth from $4 50 to $5 per ton. Large quantities of straw are annually manufactured into paper, and the demand of it for this purpose probably increases its price some 15 or 20 per cent.

Root crops are not raised to a great extent. Some farmers raise them in small quantities, say from a quarter to half an acre. Carrots and sugar beets will probably yield from 400 to 600 bushels per acre, and are worth twenty-five cents per bushel. Turnips are raised to a greater extent, less labor being required, and the yield being as great, and prices in the market the same.

The orchard.—Increasing attention is paid to fruit growing, as all kinds of good fruit are in high demand. Apples of known va-

rieties brought at harvesting fifty cents a bushel, which was an advance from last year, owing probably to the shortness of crop. Pears have yielded a tolerable supply. Plums, peaches and cherries were entirely cut off by the warm weather in December, during which the blossom buds were killed.

The growth of wood was fine the past summer, and we hope for a rich supply the next. Strawberries and grapes are cultivated only in few gardens, and for family use. They should have places assigned them in every garden, and be cultivated for the healthful luxury they afford. But it is to be feared that berries will not receive the attention they fully warrant, so long as they will grow in old, exhausted fields, along fences, and in open places in woodlands, where they become the prey to every lawless marauder that can lay clutches upon them.

Dairy.—Increasing attention is paid to raising stock and to the dairy. Farmers are improving their herds by introducing the beautiful Devons and Ayrshires more generally. The former are celebrated for their docility, ease of keeping, and for their working qualities as oxen. For milk they may be behind the Ayrshires; but, taking all qualities into consideration, it is doubtful whether there is a better breed of animals for the north.

The quantity of butter manufactured in Berkshire the past year will probably not fall short of 1,200,000 pounds, selling here at 14 to 25 cents per pound. The average price has probably been 18¾ cents per pound. The quantity of cheese made in the same period cannot fall short of 2,500,000 pounds, worth from 6 to 8 cents per pound. The surplus butter is sent to Boston and New York markets, usually once a week, from May to September. Much of the cheese is sent to the southern cities for market.

The present prices for cows are from $20 to $30, and some as high as $35. Beef is worth $5 per hundred; hides six cents per pound; tallow nine cents per pound.

Sheep.—Fat sheep are worth from one dollar and seventy five cents to two dollars and fifty cents per head; mutton does not vary much in price from beef. Skins, worth from 17 to 50 cents each. There are *very* few, if any, sales of wool; manufacturers make no offers, but *guess* it is worth from 25 to 30 cents a pound. Farmers *reckon* they will keep it awhile longer, as storage costs nothing, and they are generally not much pressed for cash. There is a general disposition to get rid of flocks, and embark in other branches of agriculture. The average yield per head is probably three pounds.

Hogs.—No essential variation from last year.

Poultry.—It would be very difficult for us to make an estimate of the average number of fowls to a family, and quite as much so to estimate the number of families. Say fifteen are wintered to each family, and how much wiser are we? It is a subject, however, worthy of consideration, and I wish that something like accuracy could be approached in the matter. Many at the present time are making the business *profitable*, and most of the farmers are deriving small incomes from it. Eggs have been worth from 12½ to 16 cents per dozen through the year, and poultry is now worth eight cents per pound.

Prices of labor, the same as last year.

Prices of transportation to Boston market, where much of our produce is sent, is for live stock forty cents per hundred pounds. Grain, roots, and vegetables, twenty cents per hundred; wool, &c., thirty-five cents per hundred.

Yours, truly,

Hon. Edmund Burke. WILLIAM BACON.

William's College, *October* 20, 1848.

Dear Sir: You request some statistics relative to the meteorology of our county. I do not know the precise object you have in view, and therefore will confine myself mainly to facts.

1st. *Mean temperature.*—This is the temperature as deduced from three daily observations during the year, (Sundays excepted.) Hours, 7, a. m., 12, m., and 9, p. m.:

Mean temperature of		October ..	52°.418	Fahrenheit.
"	"	November.	41°.4	"
"	"	December.	37°.76	"
"	"	January...	27°.17	"
"	"	February..	20°.10	"
"	"	March	29°.14	"
"	"	April	41°.54	"
"	"	May	58°.90	"
"	"	June......	63°.9	"
"	"	July......	67°.72	"
"	"	August....	67°.57	"
"	"	September.	53°.70	"
		Mean............	46°.78	"

The same element, as deduced from observations, made *monthly* on my well, 46°.81.

The instrument employed in the observations above referred to, is a standard thermometer, by Troughton & Simms, London.

I will now give the amount of rain. This is caught in a tunnel which enters my green-house, the cross section of the tunnel being half a square foot:

Rain in	October, 1847..	4.055	inches.
"	November......	1.851	"
"	December......	5.885	"
"	January, 1848..	1.403	"
"	February......	1.129	"
"	March.........	2.292	"
"	April..........	1.087	"
"	May	7.914	"
"	June..........	1.750	"
"	July	4.479	"
"	August........	2.943	"
"	September.....	2.354	"
		37.142	"

The quantity of rain in May is greater than during any month since I had made observations. The amount during the year is a little above the average.

The above conveys, I believe, all the information to which your letter refers. If the facts can be of use to you or your correspondents, they are at your service.

Very truly yours,
ALBERT HOPKINS.

Mr. William Bacon.

P. S. I might add the extremes of heat and cold during the year. The greatest cold was February 11, 23°; the greatest heat June 17, 98°, nearly

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Pembroke, Mass., *December* 13, 1848.

The state of cultivation in the county of Plymouth does not reach a large portion of the subjects of inquiry embraced in the circular sent from your office. Bordering on the sea, great numbers of our citizens are engaged in navigation, another numerous class in mechanical business, so that few are left to nurse mother earth; and she appears, in many instances, not only void of all artificial ornament, but even of a useful dress.

Where agriculture commands only a divided and subordinate attention, it is very difficult, if practicable, to present anything like just views of the state of it. We may be able to ascertain pretty correctly the two extremes of best and worst cultivation; but the medium will not be the true index of general practice. A numerous class will be found falling below the best cultivators, yet rising far above the worst. In comparing the crops of two consecutive years, we must avail ourselves, to great extent, of conjecture. Reports to an agricultural society may give some aid; but variant seasons would make our inferences from them of somewhat doubtful correctness.

The winter of 1847 and 1848 was of about the usual severity in this latitude. Snow continued some longer than is common so near the sea; all of it, however, disappeared in the month of March. April was a dry and warm month, remarkably favorable for the sowing of the small grains; and even Indian corn to some extent was planted in that month. May brought us, in this particular locality, much of that rough east wind, before which young plants and tender human constitutions shrink.

Early in June, the summer temperature seemed established; rains and sunshines were well apportioned to promote the health and vigor of vegetation.

The weather of summer was unusually uniform, with a moderate degree of heat, till about the 20th of August, when the weather became remarkably cold for that season, and continued so a week. The growth of all tender plants was checked, and, in many instances, not again renewed. But this great change, without much actual frost, at length gave place to warmer breezes.

The last days of August and the first in September were very fine; but before the middle of the month, the chilling northwesters again visited us and soon caused the fields and forests to assume the autumnal hue.

The season of vegetation was something shorter than has been common here, but rather unusually productive.

Autumn months have been cold. Winter commences with mild weather, approaching the temperature of those October days often designated as Indian summer.

Rye is cultivated in this county more, probably, than any other of the small grains. The greater portion of it is sown in August and September—one bushel of seed used on the acre. Some is sown in spring, when one-third more seed is applied. Autumnal sowing is considered as giving the best promise of a full crop; in some years, however, that sowed in spring does quite as well. This was the case the past season. The rye crop of 1848, according to the best information obtained, exceeded that of 1847, nearly 20 per cent. Domestic price, $1 per bushel.

Oats are raised to some extent—the crops this year rather unusually large. Statements give from 30 to 62 bushels on the acre. From 2½ to 3 bushels of seed on the acre. Time of sowing, from 1st of April to 1st of June. Price 50 cents per bushel.

Barley was found in comparatively few fields, and, so far as observation extended, was less productive than usual. In several instances less than 20 bushels to the acre were reported. In 1847 from 25 to 35.

Wheat was sown in fewer instances than barley. The opinion generally prevails that this grain cannot be raised here to any profit. A few enterprising men continue experiments, in the hope of ultimately discovering the cause of so frequent failures. We had one crop of the past season reported twenty-six bushels to the acre—more than thirty per cent. beyond what is ordinarily obtained.

Indian corn is raised in the county in larger quantities than any other grain. There have manifestly been great improvements within a few years in the culture of this article. It is now produced with less expense than formerly, and in greater quantity on the acre. The improvements consist chiefly in the more judicious application of manure and more effective tillage. The surface soil only is now moved among the plants, deep ploughing avoided as injurious.

The year 1847 was partially favorable to the growth of corn, and the crop of that year was uncommonly abundant. A similar result would have been realized in 1848, had not the plants been suddenly checked by the cold week in August, after which no corn was formed, and much that had partly grown was shrivelled and lost.

In fields planted late, the crop was less than that of the preceding year by 15 or 20 per cent.; but where the planting was early, and the fields carefully prepared, the corn had so far matured before the cold week, that the yield was great. Applicants for pre-

miums obtained more bushels to the acre than in many former years. The reports range from from 77 to 132 bushels on the acre. Notwithstanding these results, we should not place the average through the county beyond 30 bushels. The most common season of planting here is from the 10th to the 20th May. Domestic price of the article, 90 cents per bushel.

The crop of hay in this year was probably about 15 per cent. larger than that of the preceding year, which was considered fruitful in this article.

Hay and Indian corn are leading objects of attention with our farmers, and some very handsome improvements have been made in the cultivation.

The average yield of hay is about one ton per acre. The price from $10 to $15 per ton.

Root culture is practised here very little, scarcely enough to form any foundation of comparison between different years. A few plats of carrots and turnips have been examined the last two years, and there was no great variation in the products. Carrots yield from 300 to 500 bushels to the acre, and turnips from 400 to 700. Potatoes were cultivated pretty extensively till the appearance of the malady; since, fewer have been annually planted. The crop in 1847 was large; but the loss in decay, before and after harvest, great. The crop of the last season was considerably less; but the loss in decay, as yet, has been very trifling, and the prospect of good spring supplies is better than last year.

Early planting on dry porous soils, and with those potatoes which ripen early, have proved the most effective prevention of disease. The quantity of seed used on the acre ranges from 15 to 25 bushels. The usual price at harvest 33 cents per bushel.

Most of the products of the soil are consumed in the county. A few articles—potatoes, apples, milk, and hay—are occasionally carried to other markets, from which we draw a far greater amount in flour, grain, and meat.

The above enumerated articles comprise nearly all that are cultivated in fields. Various other plants are found in gardens, but in too small quantities for even probable estimates of the productiveness.

Orchards, which have been greatly neglected in former years, are now commanding something more of attention. The railroads furnish an easy and safe conveyance of the fruit to market.

Our stock is chiefly brought from other States. Very little is raised here. Hence, the number of animals kept is too small for any thing like systematic dairying or fattening of cattle.

Forty per cent. of our land is supposed to be in forest, and of the residue, a considerable portion is a near approach to barren waste. The wages of labor which mechanical business commands discourages, to some extent, agricultural improvements. Mechanics receive from $1 25 to $2 50 cents per day for their services, and laborers on farms think the disparity too great when they receive only from 75 cents to $1 per day, which the farmers think as much as can be justified by the value of produce.

The monthly wages of farm laborers by the year range from $12 to $17; in the summer months from $15 to $20.

In an early settled place like this, success in cultivation must depend very much in skill and industry in composting manure.

To this subject attention has been invited in annual offers of premiums for the largest and richest compost heaps.

All may not have been effected in those offers which was desired, but sufficient improvements have been made to give many of our fields new and more attractive aspects.

The resources of manure on our farms are not yet fully explored; unfortunately the attention of some farmers has been diverted from the certain path of interest, by puffed accounts of the wonderful effects of guano and certain concentrated manures, which venders have strong interest in largely recommending. An economical use of the various materials found on every farm; the early reduction of vegetable matters to the component substances, and the judicious application of those substances to fields, are the most certain means of general prosperity among farmers.

Respectfully,

MORRILL ALLEN.

Hon. Edmund Burke,
Commissioner of Patents.

Watertown, *Massabhusetts*, *Nov.* 20, 1848.

Dear Sir: Your favor of Patent Office reports, by Mr. Brown, was duly received, and I feel greatly obliged to you for the same; I will comply with your request in regard to my farm as far as I am able. I shall not be able to give you a detailed account of products grown, or receipts for each, but I propose to give you the gross amount of receipts for the years 1845, '6, and '7, as taken from my cash book. I employ one man to carry my produce to market daily, and he frequently takes an assistant with two or more loads, and he settles with me at night for all that is carried, and it is entered as cash received for marketing, except hay and pork, which are entered as such, as the case may be. And so of disbursements: I charge the farm with all labor performed, both in the house and out, (and it is all done by hired labor, as I have no family of my own residing with me, except a daughter,) all provisions and stores for family, all grain and feed for hogs, and all expenses incurred in prosecuting the business of the farm, and in keeping the buildings and farm in repair, and improvements on the ground. My whole grounds contain 120 acres, fifteen of which are wood and pasture, a large share of which is broken and hilly, and not susceptible of cultivation, and twenty-five acres more that I have reclaimed from bog or brush swamp, and are too wet for cultivation, on fruit trees. The balance, eighty acres, is employed in growing the usual crops that are produced in this section of country, and are more or less occupied by orchards of apples, pears, peaches, plums, cherries, and small fruits. Some twenty-five acres

are yearly under cultivation, and planted with about the following crops, varying as circumstances require.

Say 5 acres of corn for market and stock.
" 3 " potatoes, early and late.
" 4 " vines—melons, squash, and cucumbers.
" $1\frac{1}{2}$ " roots—beets, carrots, and parsnips.
" 1 " cabbage.
" 3 " miscellaneous—peas, beans, turnips, sallads, &c.
" 3 " rye or barley; and some six or eight acres not cropped at all, but kept constantly cultivated for the benefit of the trees, the latter in grass, which produces heavy crops, as none of it goes more than five years without ploughing. I should judge the average crop to be two tons of hay to the acre, of corn, 60 bushels, potatoes, 200, (but the last two years badly rotted and of little value); carrots, 800; beets, 700; parsnips, 600; and, as I manure liberally, my other crops are luxuriant and produce well. Two-thirds of my cultivated ground are a stiff, deep, moist soil, on a clay sub-soil. The balance a lighter and drier, but deep, warm soil, on a gravelly sub-soil, nearly the whole rolling, but not hilly.

My stock consists of four horses, four oxen, four cows, and from forty to sixty hogs, and from four to six heifers, that I raise or purchase. The horses are stabled through the year, and fed with hay and grain, each receiving three pecks of chopped hay, well wet, and one peck of meal well mixed, and fed at night, in the cool weather, and half the same, night and morning in warm weather, and a peck of carrots in the morning through the winter; oxen stabled nine months in the year, and fed as horses with half the allowance of grain, full allowance of roots through the winter, and pastured on mowing grounds in the fall months; calves pastured through the summer, and fed on corn, fodder, and hay, and roots in winter. The young cattle are sent into the country to pasture through the summer, and fed as cows in the winter. They come in at two years old and are sold with the calves. Hogs are purchased at Brighton, spring and fall, weighing from 120 to 140 lbs.; and kept six months and slaughtered. They will average 280 lbs. dressed for market, are fed on the refuse vegetables and fruit produced on the farm, which are boiled together with some 300 lbs. of beef scraps, or six bushels of meal, or an equivalent, in a kettle holding 600 gallons; after which is added, as fed, the same amount of *slimes*, a wash which I purchase at the starch factory, being the best part of washings in the process of making starch from flour; and for the last six or eight weeks, I increase the allowance of meal sufficient to keep them in the highest state of thrift.

I have three barns for storing hay—one 40 feet by 50, 13 feet posts, one 30 by 50, 22 feet posts, and one 30 by 40, 16 feet posts; and a stack barn, 56 by 60, with a mill-house, 22 by 40, on the east end, with cellar under the barn. They stand facing south—entrance at the west end. The ground falls 8 feet in 60 to the east; east of that nearly level, and level with the bottom of the cellar. The east end of the barn stands on a brick wall 8 feet

high, and the cellar is divided in the centre lengthwise, by a brick wall 12 inches thick, dividing the manure cellar from the fruit cellar. The manure cellar is entered on a level from the yard at the east end by a door, 16 feet wide, at the south end of the mill-house, for the purpose of drawing in loam and bringing out manure; and the fruit cellar is entered through the mill-house and scuttle in the barn floor, and both lighted with glass windows that open to admit the air; but neither are to be allowed to freeze in winter. The yard is protected on the west by a shed running south 100 feet, including a gateway to the feed house for hogs, which is situated on the south side of yard, 16 by 50 feet, and on the south side of that the boiling house, 16 by 25 feet. Water is brought to the shed in the yard through a lead pipe, from a rising ground 40 rods distant. Horses and cattle stand over the manure cellar, which is constantly supplied with loam, swamp muck, weeds, or any substance that will absorb the urine of cattle and hogs; and the manure spread frequently, as it is necessary for the thrift of the hogs that the cellar should be kept supplied with fresh loam, or litter of some kind, as often as it becomes wet or muddy; and the amount of manure that can be made by attending strictly to the above, is surprising. I should say not less than 600 loads, of 25 bushels each, of the best and strongest kind of manure, are taken annually from my yard and cellar, and this, for the most part, is spread and ploughed in at the rate of 30 loads per acre, more or less, as the different crops require. In addition to the above, I purchase, say 25 loads of horse manure, to mix with portions of the above for planting early vegetables, and such things as require forcing or artificial heat. I consider winter apples my best crop. Their average yield is 1,000 barrels of Baldwin's and russets. They are picked by hand and packed in barrels—stowed in my fruit cellar daily as picked. And I have a good supply and assortment of summer and fall apples, pears, peaches, plums, and cherries. The crop of peaches has been small, and quality poor, for several years past.

The whole amount of receipts for the years 1845, 1846, and 1847, are $18,834, of which $4,257 were received for hay, and $4,552 for pork—the balance for fruit, vegetables, stock, &c. The whole expenses for the same time are $10,148, of which for labor

was	$3,521
Grain and feed for hogs	2,058
Hogs	1,575
Manure	373
Provisions	260
Goods	707
Taxes	310
Stock	309
Miscellaneous	1,025

And the receipts for the years 1844 and 1848 will equal the average of the above.

In cultivating my land, my practice is to plough as deep as the

ground will admit, gradually increasing the depth until my largest grass plough will seldom reach the sub-soil. Except when rocks prevent it, I consider deep ploughing of the utmost importance; and almost any lands that are under cultivation, except rocky and clay, may be deepened by gradually turning small portions of the sub-soil to the surface to be converted by the sun, air, and frost, to productive loam. I have been at heavy outlays in clearing off rocks and draining wet lands. My practice has been, where there was fall sufficient, to make covered drains; that is, dig a trench some three feet deep, 2 to 4 feet wide at bottom, and such width at top as will be most convenient for working. Lay a drain 6 inches wide and 10 high with cobble stone, and cover with the largest size of the same, and fill with small stones to within 12 inches, and then cover with shavings and fill with earth; level with surrounding ground. Many of those drains have been down for seven to twelve years, and none of them have as yet failed to perform all that was expected of them. I have put down some 400 rods of the above, and have some 400 rods of open ditch and drains where there was not sufficient fall to admit of covering; portions of them are subject to be washed by heavy freshets in spring, which would wash away the banks, and the ditches would fall in a few years, so as to become inoperative. I tried many experiments to protect the bank, and my last one was successful, which was adopted in 1841, and was as follows: I commenced at the outlet or lower end of the ditch in June, as early as the water had fallen away so that I could work, by making temporary drains ahead in the ditch. I had the ditch cleared out and banks cut down or filled up, as the case might be, to make them straight and of the proper shape. I then commenced laying the banks with sods cut from the swamp, 6 inches wide, 18 inches long, and 4 inches thick. These were laid *grass side down*, and joints broken in the same manner that you would in laying brick, each course falling back and resting on the bank—a trench cleaned out some 4 inches before the natural level of the ditch to commence with, to prevent it from being undermined and washed away. The wall was carried up nearly to the top, when the sods were removed and laid grass side up level with the surrounding grounds. The face of the bank was then trimmed smooth with a spade, and the grass started immediately from the edges of the sods; and before winter the whole surface was covered with a rank growth of swamp grass, which has stood to this day against frost and snow, as not a rod has given way since it was finished. My manner of reclaiming swamp lands, varies according to circumstances. When the grounds are too soft to admit of ploughing, they are cleared and leveled as far as possible; and when the ground is frozen, I cart on and spread, as fast as delivered, clay, loam, or gravel, whichever are available, one and a half inch thick. On the top of that a good coat of strong compost manure, and sow with one peck of herds grass and two pecks of red-top seed to the acre. But when the lands are hard enough to plough, I prefer to plant with potatoes until the ground is well subdued, so that it can be laid in slight ridges by the plough, as

is desirable to drain. My subsequent practice is to top-dress the soft part of the swamp, and turn over the hard with the plough, and manure liberally, and stack on the sod in September as often as the grass wants renewing.

Should you prefer a more detailed account, you will please inform me in what manner you would like to have it drawn up; and you are at liberty to make use of the whole, or any part of the above, that suits your convenience.

Most respectfully yours,

LEONARD STONE.

Hon. Edmund Burke,
Commissioner of Patents.

West Cambridge, *Mass.*, *January* 15, 1849.

My Dear Sir: By request, I herewith send you a brief account of my farm, without entering into a detail of the crops grown upon it, or the manner of cultivating those crops.

My farm consists of about twenty-six acres, most of which has heretofore been considered poor and worn-out land. About seven acres are now pretty well covered with fruit trees, mostly apple and peach trees; about half of it was in full bearing the last year —the remainder will be in a bearing state this year. The whole surface of the ground is so covered with the trees as to produce a small and inferior crop of any vegetables I plant or sow among them. The remainder of my farm, being about nineteen acres, I cultivate wholly in the raising of vegetables for the Boston market. My object is profit, not ornament or show; I therefore cultivate such kinds of vegetables as in my judgment will give me the greatest net profit, keeping in view the variety which the successive crops and seasons require.

I have found it necessary and profitable to use glass for the hot-house, in forwarding plants in winter and early spring. I have 250 sashes on about 1,400 surface feet of glass, under which I grow lettuce and radishes. I also forward tomato, celery, cabbage and other plants. The two past seasons I have grown the dandelion under glass, with what I considered a fair profit. I have received three dollars a sash of eighteen square feet, or one shilling a foot, for the simple and homely article, the dandelion, grown under glass. It may not be quite so profitable again; still, I shall try it.

As I before remarked, I raise a general assortment of vegetables, such as peas, beans, early and murrame squashes, beets, carrots, onions, early potatoes, corn, and melons of all the varieties. I have raised the cauliflower and broccoli four or five years last past at a fair profit; they sell in the market at wholesale at from $12 to $15 per hundred. There are but few farmers in this county who succeed in raising them.

The manure I used in the cultivation of my farm the past year I find to be no small item of expense. One hundred and eighty-five

loads of stable manure, ten loads of night soil, composted with stable manure, meadow mud and loam, has cost me the sum of $1,347 34, including the teaming, by an account kept of the cost.

I almost always use the stable manure upon my grounds in a crude state, just as it is taken from the stable, when the ground is in a proper state to use it.

I have employed upon my farm the past season six hired men—four for eight months, two the year round—at about $16 per month per man. I have paid $80 for day laborers besides; board for my men, say $10 per month; making the expense of labor and board about $1,600.

My team consists of three horses to do the work on my farm and to carry the produce to the market. I purchase all the hay and grain to keep my horses at an expense of about $350 per year.

My other unavoidable expenses—the "wear and tear" of farming tools, wagons, harnesses, blacksmiths' and wheelwrights' bills—amount to no inconsiderable sum; but when I turn to my account of the proceeds of the sales of the produce actually sold in the market, as accurately kept by daily entries, I find the same to amount to $5,726 23, with considerable produce unsold; the balance still remaining, after deducting the above enumerated expenditures, is to me quite satisfactory—being a fair interest for the capital invested, and a reasonable compensation for my services in the management of the farm.

I have omitted to add anything by way of the increased value of my farm by the growth of my fruit trees, from a large part of which I have not yet received any crop. They are now just coming into a bearing state; I have, therefore, a right to expect, with the same cultivation, a much larger income the present and future years than that of the last year.

With much respect, yours,

GEORGE PEIRCE.

Hon. Edmund Burke.

St. Albans, Franklin county, Vermont,
December 9, 1848.

Sir: In the estimates which I have made, in reply to your circular of 1848, I have availed myself of the aid of gentlemen engaged in producing, or who are dealers in the articles, and in whose judgment I have the fullest confidence.

I have not attempted an estimate of the amount of produce consumed within the county, and some other estimates I have omitted, not having sufficient data to arrive at conclusions satisfactory to myself. When I have given quantities, I have given the surplus only, or what is sent to market.

The season has been favorable for all kinds of crops at the time of planting and harvesting, and through the season, except a small portion of the county bordering on the lake, where some of the crops were injuriously affected by drought in July.

The crops have been unusually free from injury by blight or insects, especially the wheat worm, which has heretofore been very destructive; very little damage has been sustained from it this season. There was some more wheat sown this year than last, and the crop may be estimated at 10 per cent. more.

The crop is not equal to the consumption of the county, and probably there will be required some 4,000 barrels flour to make up the deficiency.

Of coarse grains, the production is about equal to the consumption.

Potatoes, before the rot prevailed, were extensively cultivated in this county for the manufacture of starch; the crop has diminished fully one-half. There was not as many planted this as the last year, but less damage has been sustained by disease, and the crop may be estimated at 15 per cent. increase.

No remedy is known here for the potato rot. They are said to be less liable to disease when planted on land moderately rich, not too moist, and without manure; green sward is preferred.

The dairy produce is fast increasing, and is estimated this year at 15 to 20 per cent. more than the last. Preparations are making for at least an equal increase the coming year.

The quantity sent to market this year is estimated at 350 tons of cheese and 250 tons of butter, amounting to over $800,000.

The surplus wool of the county may be estimated at about 200,000 pounds, and to have decreased about 10 per cent.; since shearing, the sheep have diminished from 15 to 20 per cent.

Cattle is one of the principal productions of the county. The increase is estimated by competent judges at 10 per cent., and the sales equal in amount to last year.

Wages for agricultural labor during the season is from $10 to $14 per month, and 50 to 62½ cents per day; in haying and harvest, 75 cents to $1. Mechanics—carpenters, joiners and masons, $1 25 to $1 50 and board. Female domestics, $1 per week. The Franklin County Agricultural Society was formed September, 1844, has now about 170 members, and has paid in premiums during the past year $377 75. Rev. Benjamin B. Newton is president, and M. F. Palmer is secretary. Post office address, St. Albans, Vermont.

Very respectfully, your obedient servant,

M. F. PALMER.

Hon. Edmund Burke,
Commissioner of Patents.

Springfield, Vermont,
November 17, 1848.

Dear Sir: I received last summer a circular of queries, desiring information on various topics connected with agricultural productions, &c., as compared with 1847. The circular has been unfortunately mislaid, and now, being without a guide, only from memory by a hasty perusal of the circular at the time, I shall be una-

ble to answer all the inquiries therein requested. But so far as my recollection will serve me I will, with pleasure, give to the Patent Office the desired information.

Windsor County Agricultural Society was formed March, 1846. Present number of members, about 640. Funds from the State, $276; do. from members, $640; total, $916. Amount paid out for premiums on the 4th and 5th of October last, (annual fair,) $567; to be paid next February, on previous farms, crops, &c., about $160. Contingent expenses of the society, about $100. President of the society, J. W. Colburn; post office address, Springfield, Vermont. Secretary, Charles Marsh, junior; post office address, Woodstock, Vermont.

The state of the weather at seed time this year was very favorable for this climate—more so than in 1847. April was a very dry month; no want of rain throughout the season. September a cold month, but no frost so early and severe as to injure the crop of Indian corn, which is very good, particularly in the towns adjacent to the Connecticut river; though compared with the crop of 1847, there may be a trifling per centage off. Of wheat, there is comparatively but little produced in this section. On newly cleared lands, and on high, elevated lands, of a deep, strong soil, a good crop may be obtained; but generally it has proved a failure on our old lands, and has been mostly abandoned. Great quantities of western flour are annually consumed by the farmers themselves in Windsor county. Rye is a good crop with us on dry and light soils. Oats are a sure and profitable crop on deep and good soils. Potatoes, once so sure and profitable as food both for man and beast, have become the most uncertain of all our productions. The rot, however, is not so general as last year, though considerable in some localities. Experience has taught us that early planting is the safest remedy against this destructive malady; yet this is not sure. This crop may be considered 10 per cent. better than last year, though not over half the yield of former years. I should have said, when speaking of the oat crop, that the average yield is 25 per cent. over last year. But very little barley is grown in this region. The low price of cotton goods has for years entirely supplanted the use of domestic linens, and driven the cultivation of flax away from our country. The grass crop, so necessary a cultivation in high northern latitudes, is this year very good, though a slight falling off from last year in this region. Our pasturage and grazing lands have been more than an average throughout the season, on account of the seasonable and abundant rains. Considerable maple sugar of a superior quality is produced in Windsor county, and sells readily 33⅓ per cent. above the common brown sugars of New Orleans or the West India islands. Our root crops, except the potato, have been good this season. Garden and field vines, pumpkins and squashes in particular, have in most cases proved a total failure, in consequence of the early ravages of the vine-bug, a destructive insect, for which we know of no remedy. Apples, almost the only fruit of importance here, have come out about an average of last year. The productions of the dairy are increasing in the same ratio that that of wool is decreasing, in con-

sequence of the low prices of the latter, and the enhanced value of the former, by *foreign demand and supply*—a demand for our butter and cheese, but a supply of woollen fabrics in return. Price of dairy, same as last year; price of wool, 25 per cent. less. Average cut of fleeces, 3 pounds per head. Beef has brought a good price, and is about the same as last year.

In the raising and fattening of hogs we cannot compete with the fertile and virgin soil of the west, the cheapness of their lands, &c. We produce no more pork than is wanted for our own consumption. Horses are raised to some extent, are profitable, and will compete in any market in the United States for durability, form and beauty. Vermont horses stand at the head in our northern markets. On the whole, our agricultural interests are improving. Our county societies are awakening a spirit of improvement, and doing much good. Our railroads now in progress, and some in operation, are giving an impetus to business of all kinds; and Vermont is destined to stand at the head of the Union in agricultural productions, in proportion to area and population, for the next half century. She also has the resources of greatness in manufacturing operations; but whether these sources of national wealth are to be developed within her valleys and upon her water falls, remains yet to be seen. Considerable improvements are making in the grafting of winter fruit, setting out young orchards of entire grafted fruit, mostly for winter use; and with the facilities of railroad communication, a new source of wealth is opened to Vermont farmers in this one item.

The subject of saving and making manure is getting a prominent hold upon the ideas of our farmers; much attention and labor are now bestowed upon this subject, and a manifest improvement in the renovation of farms and the yield of crops is the result. Most of our farmers are no longer content to follow the beaten track of their fathers. Though they are not wanting in veneration for their ancestry, yet to practise upon the exhausting system of the soil, as their fathers did, is contradictory to their own good sense, intelligence and judgment, and they are fast breaking away from those old wedded customs, and, keeping their best interests in view, they are becoming modern practical men.

I think one of your inquiries had reference to wages of labor, transportation to market, &c.; also, average cost of production, and amount per acre.

Indian corn, per acre, 40 bushels; cost of labor, exclusive of worth of fodder, (which will pay the harvesting,) 28 cents per bushel. Present market price per bushel, 67 cents, 20 per cent. less than last year.

Rye, 16 bushels per acre. Present worth per bushel, 75 cents, 20 per cent. less than last year. Cost of labor in producing, 30 cents per bushel.

Oats, 45 bushels per acre. Present worth, 34 cents per bushel, 30 per cent. less than last year. Cost of producing, exclusive of straw, which will pay the threshing, 17 cents per bushel.

Hay, $1\frac{1}{2}$ tons per acre. Present worth, $6 per ton, 25 per cent. less than last year. Cost of labor, &c., $3 per ton.

Of potatoes, no correct estimate can be given, so variable has the crop been in different places.

The above statements include the expense of seed, with the labor, but no charge for manure.

Seed to the acre—Indian corn, $\frac{1}{4}$ bushel; rye, $1\frac{1}{4}$ bushel; oats, $2\frac{1}{2}$ bushels; grass, $\frac{1}{4}$ bushel; timothy, $\frac{1}{16}$ bushel, clover mixed; potatoes, 12 bushels.

Wages of agricultural labor, $13 per month; mechanics, $1 25 per day; female domestics, $1 17 per week. Transportation to market, $15 per ton formerly; in the proximity of railroads it is lessened from one-half to two-thirds.

If there are any facts herein contained that will be of any benefit to the Patent Office for the next report, I shall be amply repaid for communicating them.

Very truly, &c.,

J. W. COLBURN.

Hon. EDMUND BURKE.

NEW YORK STATE AGRICULTURAL SOCIETY'S ROOMS,
Albany, January 2, 1849.

In compliance with your request, relative to the agricultural products, &c., of this State for the year 1848, I give you such information as has been received at our rooms, and obtained from personal observation throughout the State, during the season past. As we have no statistical returns of our crops, I can only give you the general average, and a general view of the agriculture of the State. It is gratifying to be enabled to assure you that there is an advance among our farmers in their methods of conducting their operations; and the instances are neither few nor rare where farms are managed with all that skill and care which are to be found upon the best cultivated farms abroad. The results of these improved systems of husbandry are not only beneficial to the individuals who have adopted them, but their influence is happily extending to others. The prejudice, which it is probable has more or less affected the minds of most of our farmers, in relation to improvements, is fast giving way before the evidences which experience teaches them cannot well be resisted. It is important in this connexion to observe the beneficial influence exerted upon the agricultural interest of our State by our State and county societies. The change which has been wrought during the past eight years is most apparent, and much of it is traceable, I think, to the influences arising from the labors and efforts of these associations. While it is true that they have not accomplished all that they might have done, it is nevertheless apparent that in various ways they have contributed to a better state of agriculture than we have hitherto enjoyed, so much as to encourage us to make renewed efforts to render them still more useful.

It seems to me that the importance of this branch of national industry, the foundation of all our prosperity as a nation, and upon the success of which depends the perpetuity of our free institutions, demands more attention from our general government than has been given to it. While it is not expected that *legislation can make good farmers*, it is nevertheless true that, in innumerable ways, the patronage of the government might develope our resources, open new channels of trade, and encourage and elevate the farmer, and combine with other agencies to render this most important class of our citizens among the most intelligent, as they are now among the most virtuous. Upon them does the country rely for aid in time of trial, and to them and their advancement should the energies of the government be directed in proportion to their importance to the public welfare and prosperity.

The annexed general statement will give such information as I possess of our agricultural products:

Wheat.—This crop has proved generally very good; in many of our wheat growing districts it has been all that could be desired; in the language of a farmer in one of the western counties, "excellent in quantity and quality of grain." From all I can ascertain, I should think the crop will equal the average yield of former years. In some sections of the State the "wheat midge" (or "weevil," as it is called sometimes erroneously) has done some damage. To avoid the injury resulting from this insect, the *Mediterranean* wheat has been introduced to a considerable extent in some counties, and the result has been very favorable. This variety of wheat, as well as the *white-blue stem*, generally escape the ravages of this destructive insect. The yield of the Mediterranean has been large; in somei stances, thirty bushels and upwards per acre for large fields. This is a red wheat, and does not produce quite as white flour as some other varieties; but it is said that it will produce more flour to the bushel. It ripens from ten to twelve days earlier than the usual varieties. This wheat is less liable to the rust than most others. The *white-blue stem wheat* is a very handsome berried wheat, and is also said to escape the fly and rust. We received a sample of this wheat from the Hon. H. L. Ellsworth in 1843; and from the trial of this, as well as the Mediterranean, we are satisfied that they are much less liable than any varieties we have seen cultivated in this State to damage from insects or rust. In the same field, in Oneida county, our then residence, we sowed *Mediterranean*, *white flint*, and *Soule's* wheat. The former produced an excellent crop, while the two other varieties were almost entirely destroyed by the fly. At our late State show, at Buffalo, the first premium was awarded for a sample of *white blue stem wheat*, raised in Chautauque county from seed originally received from the Patent Office. Its weight, I think, was about 64 pounds to the bushel. It had for competitors our best varieties cultivated; but this was considered superior to all others. The grower sold it readily for two dollars per bushel.

While on the subject of wheat, I would refer to the improvement of Mr. Bentz, of Boonsboro', Maryland, of *unbranning the wheat*

previous to grinding, to which the attention of the public was first called by our society, as will be seen by reference to their transactions, 1847, page 190. A diploma was awarded to Mr. Bentz, and efforts were subsequently made for its introduction into our flouring mills. At our late fair, Lyman A. Spalding, esq., of Lockport, in this State, presented half a barrel of wheat, prepared by Mr. Bentz's process, for grinding. This, Mr. Spalding says, "*is the first wheat ever done by machinery, so arranged as to make it an object for a miller.* It is perfectly simple and durable, being made of cast iron, and will *unbran one hundred bushels per hour.* The machine can be furnished ready to attach to any running power for one hundred dollars." The advantages claimed for it are, "that all varieties of wheat are *improved* from five to fifteen cents per bushel, and good varieties of red and yellow wheats will make as *good* and *fair* meal as the white varieties *now do*, which ordinarily sell from ten to fifteen cents higher per bushel than the red." The *Mediterranean* wheat, after going through this process, has as white, clear berry as the white wheats, so that the objection on account of the color of the flour will not exist against wheat unbranned by this process.

In the manufacture by this process, from forty to fifty-two pounds of wheat upon an average is saved in a barrel of flour. There are also several other advantages claimed for this process, which are fully set forth in the article referred to. In a letter from Mr. S., it is said that the miller using this machine can afford to give 12½ cents per bushel more than can be afforded by mills without this improvement. Another season will doubtless more fully test its qualities; and should it succeed, as I see no reason why it should not, it will prove of immense advantage to our country. I distributed last season several samples of wheat for trial received from your office. Some of it, I understand, has done well and promises to be useful. I will give the particulars as soon as received.

Barley.—This crop is raised extensively in some parts of the State. The crop is, perhaps, hardly equal to that of last year, which was a small crop for this State. In some sections the crop was remarkably good, while in others the crop has been a diminished one; the quality of the grain is good. A new kind of barley, called the "*Cheltenham black skinned barley*," has been received at our rooms, which is highly spoken of in England. A sample of this barley I forwarded to your office. The following description of it is taken from an English paper: "This extraordinary and productive species of barley is at present to be seen in full ear and blossom near Falmouth, and, from present appearances, will be ready to cut by midsummer. It was planted in the latter part of October, and has withstood the frost, cold winds, and wet, during the winter. This barley is six rowed, and was propagated from three corns, by a tobacconist at Cheltenham, who planted it in January, 1843, during a severe frost of six weeks, and produced 5,610 grains. It is supposed to be a native of Abyssinia, where six rowed black and white barley grows very luxuriantly. The average produce of barley grown in 1847 was about

23 Cornish bushels to the acre—weight 69 pounds. It appears suited to any description of land, and proves itself good either in frost or drought. It malts well and makes good light colored ale; its flour produces excellent bread, and the straw is well adapted for platting or thatching." This barley has been distributed in different parts of the State, and some of it from which I have heard, is presenting a fine appearance. Should it succeed here, it will prove a very valuable grain, and will, doubtless, come into general use. I shall take great pleasure in giving due account of the results as they will be communicated by the gentlemen who have the grain in cultivation.

Rye.—This crop, which is not largely cultivated, is a very good crop, and probably larger than usual. The samples in market, which I have seen, have been excellent. A new variety, the "*multicole*," has been cultivated to some extent, which has been recommended as a very prolific variety; but, so far as my observation extends, the results have not been as favorable as in some other sections of the State, where it has succeeded well; another year's trial may produce equal returns here. It requires less seed than the common rye, as it tillers remarkably. I have in the agricultural rooms the proceeds from one kernel, 120 *stalks*, raised opposite this city.

Oats.—The crop of oats this year has been an excellent one. This is a very important crop in this State, and the price during the year has been such as to render it a very profitable one. Our farmers are beginning to learn that a crop of sixty bushels, at least, may be raised without difficulty, and many crops largely exceed this. On a farm within a few miles of this city, on the sand plains between here and Schenectady, the yield of oats for the last four years has been equal to 60 bushels per acre; this has been secured by raising turnips, feeding sheep off the land, and turning in a green crop clover. In Jefferson county, a yield of 110 bushels per acre has been reported, weighing 41 *pounds to the bushel.*

Buckwheat.—The crop has been very good, and the samples of grain in market remarkably fine. A new variety is cultivated in Sullivan and Otsego counties, called the blue buckwheat, which is highly spoken of. It can be sowed as early as the first of June, and is said seldom to be affected by the hot sun, and yields well, and where cultivated has almost entirely superceded the ordinary buckwheat. The seed was obtained from a German, in Lancaster county, Pennsylvania, who said it was called "Canada buckwheat," and probably came from Canada. The flour commands twenty-five cents per 100 pounds over the ordinary buckwheat flour in the New York market.

Indian corn.—The past season has proved, upon the whole, a very favorable one for this all-important crop. The corn filled remarkably well, never better; and the quantity raised is probably larger than in any former year. Our farmers in some of the wheat growing districts are bestowing more attention upon this crop. It doubtless pays as well as any crop raised, and is devoted to more

useful purposes than any other grain. Great care is taken to preserve the stalks in good condition, and the practice is becoming general to cut them up and mix them with shorts or meal for the use of cattle; and their value is equal, I should think, per ton weight to good hay. Such, at all events, is the opinion of some of our best farmers who have made the trial.

Potatoes.—The yield has been light, but the crop less affected with disease, taking the whole State, than any year since it has been prevalent. As yet no sufficient cause has been assigned for the disease, satisfactory to the public at large. Early planting, on "moderately good soils of strong varieties and well cultivated," has succeeded best, in the opinion of a gentleman who has given much attention to the subject; and, as a general rule, I think it may be said that *early* planting has succeeded best; but, as if to defy all calculations, many of the earlier planted crops entirely failed this year, while those later planted in the same vicinity escaped entirely. An article on the potato disease, by Rev. C. E. Goodrich, Utica, in vol. Trans. 1847, page 425, displays much research and a careful examination of the effect of the seasons and alternate changes of weather; and Mr. G. says that the experience of the season of 1848 fully confirms his views, as contained in that article.

The crop of *hay* has been excellent, exceeding, I think, the usual yield considerably. The season was favorable for its early growth, and the result has been a very abundant crop.

Flax.—More attention, I think, is given to this crop than formerly. From my observation the past season, I should think a considerable greater breadth of land has been in cultivation with flax than for several years, and the return has been very fair.

Tobacco —Very little raised. Where it has been attempted, it has succeeded very well; but it will never be a crop that will receive much attention in this State.

Silk.—There are comparatively few who attend to the preparation and manufacture of silk. Fine samples of sewing silk, as well as manufactured goods, are exhibited at many of our shows, and those who have *steadily* pursued the business have made it profitable. It deserves much more attention than it receives; and, if encouraged by the general and State governments, as I think it should be, the quantity would be increased, and a supply eventually for our own consumption be secured.

Sugar.—The manufacture of maple sugar is very extensive in this State, and much of it of a character equal to the very best sugar in market. As an evidence of the perfection which has been secured, I give you an extract from the report of the judges on sugar at our last show. The judges say: "The first premium is awarded Benjamin Gaus, jr., of East Bloomfield, for a sample which is unequalled, it being in *the style*, and *fully equal* in appearance and grain, to *Stuart's* or *Wolsey's best crushed sugar.*" Of another sample, they say: "It is very white, coarse-grained sugar, *fully equal* to *Stuart's best coffee sugar.*" Another: "A sample of fine yellow coarse-grained sugar, resembling a good ar-

ticle of St. Croix sugar." The judges were merchants of Buffalo, fully competent to judge, and their decision shows to what a state of perfection the manufacture has attained. It is hoped that the census of 1850 will give a full account of the amount manufactured in this State, as it was omitted in our State census of 1845.

Root crops.—There are but comparatively few sections of the State where much attention is given to the cultivation of roots; still there are many who have pursued their cultivation with success. Of their value, there can be little doubt; and where the raising of them is understood, and the land is favorable, they prove not only profitable for feeding cattle, but, when fed to sheep, they also secure the enriching of the soil, and leave the land in fine condition for succeeding crops.

The following statement of an excellent farmer in this State, who raised last year 1,317$\frac{2}{5}$ bushels of ruta-bagas per acre, estimating 50 lbs. to the bushel, will, I doubt not, be found useful:

"Having the last eight years cultivated the ruta baga crop extensively (from four to six acres yearly) for feeding, I annex my method of culture. Generally, I have taken fields that have laid from three to five years in grass in good condition, without using any manure, turning over the sod the fall previous. In the spring, between the first of May and the 15th or 20th of June, (which latter time is the time of putting in my seed,) I generally plough and harrow, at intervals in succession, the ground from two to three times, (depending on the stiffness of the sod,) the last time harrowing immediately before drilling in the seed, using a fine light garden harrow, tearing the surface as smooth as possible. As soon as the plant obtains three or four leaves, I commence with a weeding knife to thin and weed, having help sufficient to finish as soon as possible; I then follow with a cultivator. As soon as necessary, I go through with a hoe, rather taking the soil from the plants instead of adding thereto, and then completing the thinning process, leaving a distance of from six to ten inches between the plants, (the drill rows being as near thirty-three inches as possible,) then follows the cultivator—always using the cultivator last. By using good land, I get a cleaner crop with less labor, with about the same yield as using land under culture with manure."

From the success which has attended this method of cultivation, I deem it one of the best methods of raising roots with which I am acquainted.

Peas and beans.—The average yield of these crops is between 20 and 40 bushels. Peas are generally cultivated. I have seen, the past season, large fields of beans growing, and I should judge that increased attention is now being given to this crop.

Rotation of crops.—I believe the number of farmers is rapidly increasing in this State, who are giving attention to a rotation of crops, that will secure the thorough culture of the land, with increased fertility. It has been the practice especially in some of the wheat growing districts to crop with wheat as long as the land would yield even a small return; but the experience of late years has shown that the

land would not bear this, and return any sufficient remuneration. A change is apparent, and I doubt not the time will soon come when the adaptation of the crops to the nature of the soil and climate will be generally attended to, so as to secure a continued succession of crops, that will remunerate the farmer and still preserve his land in an improving condition. That this can be done by judicious draining and manuring, and by a proper rotation of crops, has been demonstrated by many of our farmers; and when it shall generally prevail, will add immensely to the wealth and prosperity of the State.

Fruit.—The culture of fruit for our own markets, and for exportation, is receiving much attention throughout the State. The soil and climate of New York, taken as a whole, I believe is the *best fruit growing region* in the world. There is no fruit which is sent to the English market that keeps as well and arrives in so good condition as ours. The extent of this traffic is very large. A single individual from one of our extreme counties, (Niagara,) shipped, the past fall, to Liverpool, 2,000 barrels of apples of 25 different varieties. I noticed in a Chicago paper that there had been received there, the past season, from New York and Ohio, from 8 to 10,000 barrels, and that the New York fruit was esteemed the best. Whether this arose from more care and attention in selecting and packing, or from the superior flavor of the fruit, I do not know. The appearance of the Ohio fruit which I saw at the Pomological Convention at Buffalo, was certainly equal to any I have ever seen; and I should suppose the fruit of northern Ohio would be as good as any of our western fruit. The growing importance of the fruit business induced the State Agricultural Society, in connexion with the Horticultural Society at Buffalo, to call a convention of fruit growers from all the States in the Union and the Canadas. The convention was held, and a large number of delegates, and others of the most distinguished pomologists and fruit growers from 14 different States and counties were present—Massachusetts, Vermont, Connecticut, New Jersey, New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Missouri, Canada, east and west. This was, I believe, the *first* general convention ever held in this country, and the results of its deliberations were of the most satisfactory character. The deliberations of the convention, the open examination of all fruits exhibited, and the discussions of the members, were calculated to do great good, and the mass of information received was of the most valuable character. The convention resolved to continue their sessions *annually*, and organized under the name of "*The North American Pomological Convention*," and appointed the next annual meeting to be held at the place of holding the next annual fair of the New York State Agricultural Society. It cannot, I think, be questioned, that the results of the labors of this convention, as they shall continue from year to year, will be productive of great good, and finally secure a list of fruits suited to every portion of our country of the most valuable character, and rid us of the almost countless varieties that are unworthy of cultivation, which

are annually palmed off upon those who are unacquainted with their worthless character. Believing that the proceedings of the convention in an abridged form will be useful to the country at large, I have selected some portions of the proceedings, as furnished by one of the secretaries, Herman Wendell, M. D., of Albany, which will, I presume, be useful, as well as interesting.

The convention was organized by the appointment of the following officers:

President—David Thomas, N. Y.

Vice Presidents—William R. Coppock, N. Y.; J. W. Hayes, N. J.; A. T. Prouty, Mich.; S. P. Beecher, Wis.; Dr. C. Beadle, C. W.; Henry H. Coit, Ohio; J. D. G. Nelson, Ind.; J. A. Kennicott, Ill.; Thomas Allen, Mo.; W. J. Hayes, C. E.

Secretaries—Dr. Herman Wendell, Albany, N. Y.; William R. Prince, N. Y.

The following rules were adopted for the government of the business of the convention:

1. During the hours of the day, the examination of varieties of fruit shall engage the attention of the convention. The most perishable shall be brought forward first by a committee of five, appointed for that purpose. One specific variety only shall be examined at a time, by calling on all delegates present for specimens of that variety for comparison and decision; and so on till all are examined. Only brief statements of facts in each case are to be allowed, that as little time may be occupied as possible.

2. In cases where the convention cannot agree upon disputed questions relative to the merits or correct names of varieties, the whole subject shall be referred to a special committee of five, to examine and report thereon.

3. During evenings and intervals, general discussion on various subjects of pomological interest may engage the attention of the convention.

4. During any discussion no member of the convention shall occupy more than ten minutes at a time, nor shall speak more than twice on any one subject.

Adopted.

Messrs. Benjamin Hodge, F. R. Elliott, Charles Downing, Thomas Hancock, Patrick Barry, J. J. Thomas, Charles Tainter, were appointed a committee on fruit.

The following number of varieties of fruit were exhibited to the convention:

By R. Manning, Salem, Mass.: 75 varieties of pear.

By W. R. Coppock, Buffalo: 4 varieties of grape, 1 of pear.

By Bissell, Hooker & Sloan, Rochester, N. Y.: 37 varieties of apple, 11 of pear, 11 of peach, 1 of grape.

By H. H. Coit, Euclid, Ohio: 2 varieties of pear, 7 of peach.

By Elliott & Co., Cleveland, Ohio: 78 varieties of apple, 68 of pear, 17 of peach, 5 of plum, 5 of grape.

By A. Hindekoper, Meadville, Pa.: 8 varieties of apple, 7 of peach.

By Thomas Hancock, Burlington, N. J.: 42 varieties of apple, 29 of pear, 7 of peach, 1 of almond.

By Charles Downing, Newburg, N. Y.: 132 varieties of apple, 24 of pear.

By A. J. Downing, Newburg, N. Y.: 11 varieties of apple, 11 of pear, 5 of peach, 2 of nectarine, 7 of plum.

By A. T. Prouty, Kalâmazoo, Mich.: 65 varieties of apple, 6 of pear, 5 of plum.

By N. Goodsell, Greece, N. Y.: 71 varieties of apple.

By Montreal Horticultural Society: 86 varieties of apple.

By James Dougall, Amherstburgh, C. W.: 31 varieties of apple, 7 of pear, 10 of plum, 21 of peach, 2 of nectarine, 5 of grape.

By Morse & Houghton, Cleveland, Ohio: 27 varieties of apple, 13 of pear, 2 of plum, 3 of nectarine, 1 of grape, 7 of peach.

By M. Linley, Euclid, Ohio: 12 varieties of apple, 14 of peach.

By Captain J. Brayton, Ravenna, Ohio: Bartlett pear.

By J. W. P. Allen, Oswego, N. Y.: 21 varieties of pear.

By Dr. Herman Wendell, Albany, N. Y.: 1 variety of pear.

By David Thomas, Aurora, N. Y.: 46 varieties of apple, 12 of pear.

By J. J. Thomas, Macedon, N. Y.: 7 varieties of apple, 7 of pear, 10 of peach.

By Charles Hamilton, Canterbury, N. Y.: 20 varieties of plum.

By W. R. Smith, Macedon, N. Y.: 5 varieties of summer apple, 19 of pear, 5 of peach.

By A. C. Hubbard, Troy, Mich.: 26 varieties of apple, 1 of pear, 1 of peach, 9 of grape.

By C. A. Chipman, Mich.: 14 varieties of apple.

By McIntosh & Co., Cleveland, Ohio: 36 varieties of apple, 41 of pear, 4 of peach, 4 of plum, 3 of grape.

By George Hoadley, Cleveland, Ohio: 30 varieties of apple, 49 of pear, 1 of peach.

By T. P. Handy, Cleveland, Ohio: 1 variety of peach.

By J. Gillett, Cleveland, Ohio: 1 variety of grape, 1 of pear.

By F. Whittlesey, Cleveland, Ohio: 17 varieties of apple, 4 of pear.

By H. W. Rogers, Black Rock, N. Y.: 15 varieties of pear.

By A. Erickson, Rochester, N. Y.: 2 varieties of pear, 1 of peach

By B. Hodge, Buffalo, N. Y.: 63 varieties of apple, 28 of pear.

By Elwanga, Barry, & Rowe, Rochester, N. Y.: 32 varieties of apple, 22 of pear, 12 of peach.

By F. Baby, Windsor, C. W.: 6 varieties of apple.

By E. D. Lay, Ypsilanti, Mich.: 28 varieties of apple, 4 of pear.

By J. Featherly, Wayne, Mich.: 5 varieties of apple, 2 of peach.

By J. C. Holmes, Detroit, Mich.: 2 varieties of peach, 1 of plum, 2 of grape.

The fruit committee introduced various fruits to the notice of the convention, which elicited important and interesting discussions, which were published at the time of the meeting. The following compute the decisions of the convention:

Apples—Of first rate quality, and worthy of general cultivation: *Early Strawberry; Sweet Rough; Summer Rose; Yellow Harvest,*

(this is the apple described by Downing as the Early Harvest; it is also called by some, but incorrectly, the white Juneativy;) *Early Joe*, (when freshly picked it is unfit for distant transportation, as it loses its flavor;) *Dyer* or *Pomme Royal; St. Lawrence; Sine Qua Non; Fameuse* or *Pomme de Neigè*, (in northern regions especially;) *Rhode Island Greening; Roxbury Russett; Green Newtown Pippin; Vandevoeir; Westfield Seek-no-further; Lowell*, (though not fully first rate, worthy of general cultivation on account of its many good qualities;) *Gravenstein; Esopus; Spitzenburgh; Northern Spy*, (when carefully pruned;) *Swaar; Baldwin*, (in Ohio this variety is subject to bitter rot, and therefore worthless in that locality;) *Fall Pippin; Late Strawberry; Belmont* or *Gate Apple; Rambo*, (when well cultivated;) *Mother*, (this is unsuccessful in Ohio;) *Hubbarston's Nonsuch; Pomme Gris*, (in northern regions;) *Bullock's Pippin*, (this is incorrectly described by Downing as the American Golden Russett;) *Jersey Sweet; American Summer Pearmain; Summer Hagloe*, (not unanimously; this was described in the first editions of Downing's Fruits as the Hagloe Crab, which is a different variety.)

The following as second rate: *King of Pippins; Ribston Pippin*, (second quality in Canada, but third south of there;) *Tart Rough*, (this is described by Mr. Downing as a synonym of the Yellow Harvest or Early Harvest, but it was decided to be quite distinct, as it is three weeks later in coming to maturity;) *Summer Queen*, (acid, first rate for cooking;) *Poughkeepsie Russet*, (this is described by Downing as the English Russet; it was decided to be of first quality as a keeper;) *Minister; Tool's Indian Rare Ripe*, (first rate for cooking purposes;) *Twenty Ounce Apple*, (first in size, beauty and productiveness;) *Duchess of Oldenburgh*, (first quality for cooking;) *Red Astrachan*, (first quality for cooking.)

The following as third rate: *Red* and *Green Sweeting; Beauty of the West; Augustine*, (a sweet apple, sometimes called the Summer Queen, but erroneously.)

The following were passed by on account of diversity of sentiment: *Detroit Red; Belle et Bonne; Yellow Newtown Pippin; Yellow Belle Fleur; Streaked Gilliflower*, and *Bourassa.*

The following decided unworthy of cultivation: *Gloria Mundi, Hawthornden*, and *Cornish Gilliflower.*

Pears.—The following examined and decided to be of first quality: *Bloodgood; Tyson; Rostiezer; Dearborn's Seedling; Williams' Bonchretian or Bartlett; Marie Louise*, (some few dissenting;) *Louise Bonne de Jersey; Stevens' Genesee*, (some few dissenting;) *White Doyenne*, in western New York and some other localities; *Andrews; Beurre d'Aremburgh.*

The following of second quality: *Cabot; Cushing; Beurre De Amaulis*, and *Washington*, (worthy of cultivation in large collections, though not fully first rate.)

Unworthy of cultivation: *Julienne; Orange Bergamot; Brown Beurre; Resè de la Motte; English Autumn Bergamot.*

The *Foster's St. Michael* and *Swan's Orange* were passed by, as

not sufficiently known by most in the convention to warrant them in giving an opinion.

Plums.—Of first quality: *Washington; Green Gage; Purple Favorite; Red Gage; Prince's Imperial Gage; Jefferson; Bleeker's Gage; Diapree Rouge; Coe's Golden Drop.*

As nearly of first rate quality: *La Royale* and *Smith's Orleans.*

As first rate for culinary purposes, but third rate for desert: *White Magnum Bonum* and *Yellow Egg.*

And as third rate, the *Diamond plum.*

Peaches.—First quality: *Cooledge's Favorite; White Imperial; Large Early York*, (sometimes called Late Early Rare Ripe or Honest John. This is *not* the Early York of Downing, which is of smaller size, oval form, of higher color and less flavor;) *Old Mixon Free Stone; Early Malden; Haines's Early Red*, (some considered this as identical with the large Early York or Honest John; but others differed, and considered it sui generis;) *Early Barnard*, sometimes called Yellow Alberge, or Yellow Rare Ripe.

The following second quality: *Crawford's Early Melocoton; Royal George*; *Early Rose*, (this is *not* the Early Strawberry peach of Downing;) *Snow Peach*, (some considered this as of first quality, some as unworthy of cultivation; but nearly all as valuable for preserving.)

Unworthy of cultivation: *Blood Cling; Yellow Melocoton; Nectarines*, &c.

The *Large Early Violet Nectarine*, which is distinguished for its superior size and other good qualities; the Downton *Nectarine* and the *Moor Park Apricot;* were all voted as of first rate quality and worthy of general cultivation.

J. D. G. Nelson offered the following resolution, which was unanimously adopted:

Resolved, That a committee of seven be raised, for the purpose of taking into consideration the propriety of holding future pomological conventions; and, if deemed advisable to hold such conventions, that said committee report such plan for its organization as may be deemed necessary to carry out such object.

The following gentlemen were appointed by the chairman as said committee: J. D. G. Nelson, Ind.; James Dougall, C. W.; F. R. Elliott, Ohio; Dr. J. C. Holmes, Mich.; Dr. Herman Wendell, Albany; Lewis F. Allen, N. Y.; N. Goodsell, N. Y.

Mr. J. D. G. Nelson, chairman of the Committee of seven appointed to take into consideration the propriety of holding future pomological conventions, reported the following resolutions, which were unanimously adopted.

The committee appointed under the resolution inquiring into the expediency of calling future pomological conventions, having had the same under consideration, make the following report:

Whereas, the New York State Agricultural Society, in drawing together this present convention, have brought together an assemblage of men and fruits which promises great advantage to the public at large, it is thought best to perpetuate the same; therefore

Resolved, That hereafter an annual assemblage or convention

shall be held under the name of "North American Pomological Convention."

Resolved, That this convention shall be held in the coming year of 1849 in the town or city in which the New York State Agricultural Fair may be held—to convene its session the first day succeeding the closing of the Fair—and that the recording secretary of the New York State Agricultural Society shall be entrusted with the charge and respectfully solicited to give due notice of the time of meeting, by means of agricultural journals, and cards of invitation to gentlemen pomologists and horticultural societies throughout the Union and the Canadas, that they may send delegates or attend and bring or send specimens of fruit for exhibition.

The committee have appointed State committees to report to the convention, at its next meeting, all matters of pomological interest, and the varieties of fruit in their respective States and districts, their value, &c.

The following lists of fruits, from a portion of the States and territories represented in the convention, out of which the fruits selected by the convention as worthy of cultivation were taken, will show the great extent to which the varieties have already extended, many of which are wholly unworthy of cultivation; and these do not, by any means, embrace anything like the whole of the varieties grown in different parts of the country, or exhibited at the convention, as I have selected one of the largest lists from each State; many others were embraced in other lists:

By R. Manning, Salem, Massachusetts:

Pears.—Heathcote, Ronville, Belle et Bonne, Marcelis, Huguenot, Winter Nelis, Foster's St. Michael, Nova Maria Louise, Louvreine, Capiaumont, Beurre Kenrick, William's Early, Cushing, Herricart, Petre, Andrews, Hadley, Washington, Surpass Virgalieu, Pacilleau, Long Green of Duhamel, Shobden Court, Bleeker Meadow, Paradise d'Automne, No. 177 of Van Mons, Urbaniste, Croft Castle, Beurre Van Marrum, Astontown, Capsheaf, Comte de Larny, Golden Beurre of Bilboa, Fig pear of Naples, Chapman's, Fondante d'Automne, Jalonsii, Reine des Poirns, Las Canas, Pennsylvania, Bergamot d'Automne, Bezi Montigny, Havard, Henry the Fourth, Wilkinson, Colmar Epine, Cross, St. Ghislain, Comte Lelieur, Flemish Beauty, No. 182 V. M., Queen of the Low Countries, Doyenne Boussock, Marie Louise, Gill, Van Assene, Dundas, Vicar of Wakefield, Althorp Crassanne, Bergamot Cadette, Summer Thorn, Fulton, Beurre Bosc, Tyson, Roztiezer, Rousselette d'Esperin, How's Incomparable, Long Green, Charles of Austria, Beurre d'Aumallis, Bon Chretien Fondante, Bezi de la Motte, Passans du Portugal, Dix, Alpha, No. 1454 V. M.

By Charles Downing, New York:

Apples.—Victorious Reinnette, Late Strawberry, Winter Golden Sweet, English Russet, Roman Stem, Alfriston, President, Ladies Sweet, Soden Sweet, Aborgan Apple, Jersey Sweet, English Golden Pippin, Reinnette Van Mons, Hubbardston Nonsuch, Indian Prince, Golden Apple, King of Pippins, Lyman's Pumpkin Sweet, Victuals and Drink, Golden Ball, Kaign's Spitzenburgh,

Fall Harvey, Holtien Sweet, Sawyer Sweet, Minister, Cornell's Fancy, Canada Reinnette, Fall Jenneting, Federal Pearmain, Black Lady Apple, Amber Siberian Crab, Large Red Crab, Foxley Crab, Jonathan, Smith's Cider, Kenrick's Autumn, Eustis, Yates, Maiden's blush, Brabant Bellflower, Rambo, Downton Pippin, Osborne's Sweet, Sapson, Conway, Lovett's Sweet, Golden Russet, Zank, Boxford, White Seek-no-further, Summer Queen, Red Gillflower, Tolman Sweet, Laquier, Adam's Sweet, Baldwin, Schoonmaker, Summer Rambo, Porter, Wine Sweet, Lady Apple, Murphy, Fall Pippin, Sprague, Cole, or Scarlet Perfume, Kirke's Lord Nelson, Scarlet Pearmain, or Bell's Scarlet, American Golden Pippin, Lady Healy's Nonsuch, William's Favorite, Titus's Pippin, Blenheim Pippin, Cambuthnethen Pippin, Spring Greening, Angle, Royal Russet, Baldwin Sweet, Ross Nonpareil, Autumn Pearmain, Danver's Winter Sweet, Tewkesbury Winter Blush, Cumberland Spice, Shrewsbury Pippin, King of Pippins, Cornish Aromatic, Hawthornden, Well's Sweet, Peach Pound Sweet, Fall Vandevere, Killham Hill, Lawson, Red Gilliflower, Sturmer Pippin, Winter Sweet Paradise, Green Winter Sweet, Pafroon's Pleasant, Spice Sweet, Mother, Devonshire Queen, Gravenstein, Berry Bough, Springport Pippin, Wellington, Michael Henry, Yellow Ingestrie, Belden, Lucomb's Seedling, Summer Hagloe, Wood's Greening, Sweet Greening, Rymer, Brook, Watson's Dumpling, Beauty of Kent, Golden Sweet, Twenty Ounce Apple, Monarch, Wine Sap, Otley, Wine Apple, London White, Hawthornden, Fameuse, Mouse, Hooker, Moore's Sweet, Early Chandler, Nonsuch, Cabastrea, Hamburgh.

By the Montreal Horticultural Society, Canada:

Apples.—Peach Apple, Yorkshire Greening, Royal Codlin, Seedling Greening, Spitzenburg, Borassa, Greening, Golden Rennet, Nicholson's Large, Spanish Rennet, Rennet, Winter Greening, Donallaa's Seedling, Canadian Pursmouth, American Large, Pippin, English Greening, Cluster Spitzenberg, Seedling Fameuse, Manx Codlin, Summer Queening, American No. 3, Red Astracan, Early August, Seedling Pippin, Golden do., Spreading Rousseau Apple, Seedling from I. Lawrence, Miner's Dumpling, English, Ottowa, America, Ribston Pippin, Sword's Cluster, Golden Sovereign, Fameuse, Seedling, White Keswick Codlin, Colvill do., Grant's Major, Cone Favorite, Rousseau Upright, John Richardson, Large English Greening, Sword's do., Seedling Rennet, McGregor's Early, Rozemont's Seedling, Pomme Gris, Erech Codlin, M'Gregor's do., Bouthillier's large Greening, Winter Strawberry, Farron Pippin, Nonesuch, Seedling from Rousseau, M'Gregor's Baking, Summer Strawberry, American No. 2, Young's Greening, Emperor Alexander, American No. 7, Scarlet Nonesuch, Greening, Small Pippin, Bagg's Griffin, Keswick Codlin, Spreading Pomme Gris, inferior, Williams' Rod Codlin, Kentish Fillbasket (supposed,) Irish Purse Mouth, Rousseau, (spreading variety,) Niagara Spitzenberg, Malson's Greening, Sword's Early Apple, Fameuse Seedling, American, (supposed,) resembles Ribson, Rhode Island Greening, Carlisle's Codlin.

By James Dougall, Amherstburgh, C. W.

Apples.—King of Pippins, Flushing Spitzenburgh, Esopas do., Labute, Red Calville, Roseau, Long Roseau, Golding, Green Newtown Pippin, Hawthorden, American Summer Pearmain, Royal Russet, Pomme Grise, Small Pomme Grise, Large Yellow Rough, Montreal Winter Caville, Bourassa, Summer Queen, Scarlet Pearmain, Ribston Pippin, Goyean, Fameuse or Snow, Keswick Codlin, Baldwin, Mela Carla, American Golden Russet, Alexander, English Nonpareil, two kinds for a name.

Pears.—Passe Colmar, Easter Beurree, White Doyenne, Seckel, Glout Morceau, Countess of Lunay, Napoleon.

Plums.—Imperial Gage, Prince's Yellow Gage, Coe's Golden Drop, Mediterranean, Pond Seedling, Reine Claude Violet, four kinds Seedlings.

Peaches.—Barnard's Yellow, Early Yellow Rareripe, Orange Freestone, Pine Apple, George 4th, Princess Paragon, Grosse Mignone, Bellegrade, Late Red Rareripe, Teton de Venus, Carolina Cling, Pavie de Pompone, White Brunswick, Double Montague, President, Early Rose, Noblesse, Early Malden Seedling, three varities seedlings.

Nectarines.—Early Violet, Large Early do.

Grapes.—White Sweet Water, Blaek Cluster, Green Swiss, Catawba, Isabella.

By Elliott & Co., Cleveland, Ohio:

Pevrs.—Beurre Van Marum, Napoleon, Tilton, Gansells, Bergamotte, Moorfowl Egg, two varieties without name; Frederick of Wirtemberg, from trees on pear stocks two years from the bud; White Doyrune, Ne Plus Meuris, Chaumontel, Duchess D'Angouleme, Jaquinnette, Beurre Bosc, Spanish Bon Chretien, Knight's Monarch, Johonnot, Ananas d'ete, Green Mountain Boy, Lawrence, Brown Beurre, Louise Bon de Jersey, Pound, Bleecker's Meadows, Passe Colmar, Summer Franc Real, Dearborn's Seedling, Winter Nelis, Bezi de la Motte, Aston Town, Swan's Egg, Summer Bon Chretien, Zoar Flat, Lewis, Passans du Portugal, Beurre Coit, Beurre Ranz, Duchess d'Mars, Beurre D'Aremberg, Beurre Easter, Berlinghame, Andrews, Rouzsellet of Rheims, Charles of Austria, Gray Doyenne, Duchess D'Berris as a synonym of Duchess D'Angouleme, Heathcote, Wilkinson, Bon Chretien Napoleon, Honey, Musk Robert, Surpasse Vigalien, Urbaniste, Bon Chretien Fondante, Ambrosia, Steven's Genesee, Sickle, Baffum, Thompson, Compte de Lamarg, Foster's St. Michael, Capiaumont, and 19 Bartletts of large size, from a tree on the pear stock six feet high; also, some specimens from trees two years from the bed, on the pear stock—68 varieties.

Apples.—Holland Pippin, Keswick Codlin, Tart Bough, Connecticut Red Side, Danver's Winter Sweet, Jersey Sweet, Ross' Nonpariel, Belmont, Cake, Maiden's Blush, Pomme Gris, Laquier, Swasey, Tewksberry Winter Blush, Red Ingestrie, Kerry Pippin, Brabant Bellefleur, Red and Green Sweet, Porter, Roxbury Russett, Pomme de Neige, Goble Russet, Priestly, White Pearmain, Sapson, Moore's Sweet, Clark Apple, Court of Wyck, Fall Wine, Margil,

Randal Bert, Blake Calville, Hollow Crown Pearmain, Baldwin, Black Bristol, Jonathan, Yellow Ingestrie, Queen Anne, Dominie, Late Strawberry, Broadwill, Rambo, Gravenstein, Swaar, American Summer Pearmain, Loan's Pearmain, Boxford, Chaddler, Lansingburg, Roman Stem, Esopus Spitzenberg, Beauty of Kent, Ramsdell's Winter Sweet, Molasses, Pound Sweet, Talmon Sweeting, Mank's Codlin, Black, Parson's Early, Tift's Sweeting, Cable's Gilliflower Black Gilliflower, Fall Seek-no-further, Shipper's Russet, Rhode Island Greening, Downton Pippin, Winter Pearmain, Dutch Codlin, Prior's Red, Salem Sweet, Peck's Pleasant, Newtown Pippin, Stroat, Cabbage, Fall Harvey, Golden Sweeting—78 varieties.

Peaches.—Large Blood Cling, Prince's Rareripe, George the Fourth, Atwater, Penfield, White Imperial, Orange, Malta, Morrisania Morris' Red Rareripe, Yellow Rareripe, Yellow Alberge, President, Cable's Early, Seedlings No. 1, Seedlings No. 2, Seedlings No. 3—17 varieties.

Plums.—Emerald Drop, Green Gage, Long's Yellow, Blue Damson, Chickasaw—5 varieties.

Grapes.—White Sweetwater, Red Muscat of Alexandria, Isabella, Olmstead, Long's Yellow—5 varieties.

By McIntosh & Co., Cleveland, Ohio:

Pears.—Steven's Genesee, Heathcote, Grey Doyenne, Bezi Vaette, Autumn Colmar, Sienble, White Doyenne, Beurre de la Pentecote, Easter Beurre, St. Ghislains, Brussels Bonchretion, Duchess de Angouleme, Gansel's Bergamote, Beurre Aurora, Louise Bonne of Jersey, Julienne, Beurre de Naples, Rousselet de Rheims, Burgamote de Pyris, Cabot, Foster St. Michael, Cushing, Fondante de Boise, Buerre Diel, Uvedales St. German, Bartlet, Compte de Lamey, Lewis, Princes St. Germain, Wilkenson, Rushmore's Bon Chretion, Newtown Vergalieu, Pound, Old St. Germain, Seckel, Napoleon, Surpass Vergalieu, Shippea Doyenne, Fredrick of Wurtemburg, Marie Louise.

By A. Hindekoper, Meadville, Pennsylvania:

Apples.—Sweet Bough, Mumford, Broadside, Vallonia, Pomona, Summer Red, Fall Pippin; one seedling, no name.

Peaches.—Astor Noblesse, Washington, Late Admirable, White Blossom, Barrington, Columbia; a variety not named.

By Thomas Hancock, Ashton Nurseries, Burlington, N. J.:

Apples.—Autumn Pearmain, Api Petit, Baldwin, Boxford, Smith's, Cider Cumberland Spice, Fall Pippin, Gloucester White, Golden Crabb, Grand Sachem, Greening, *Wood's*, Green Newton Pippin, Hagloe, Harrison, Hawthorndeen, Jersey Greening, Juneating, *red*, Kilmanhill, Keswick Codlin, Maiden's-blush, Michael Henry Pippin, Monmouth Pippin, Newark Pippin, Redling, Cooper's, Rhode Island Greening, Ridge Pippin, Roman Stem, Roxbury Russet, Sheepnose, Summer Pearmain, Sweet Vandeveer, Tewkesbury Winter-bush, Victorious Reiennette, White Sweet Wetherills, White Seek-no-further, Wine Apple, Winesop, Yellow Newton Pippin.

Pears.—Beurre, Easter, Beurre, golden, de Bilboa, Beurre de Capiaumont, Beurre Bronzee, Beurre, or Julienne de Cox, Bezi de

la Motte, Crassanne, Althorp, Doyenne Gris ou Rouge, Doyenne Gris, No. 2, Doyenne, white, Dumortier, Duchess d'Angouleme, Echasserry, Enfante Prodige, Fulton, Henri Quatre, Hericart, 2d growth, Holland Green, Inconnue Van Mons, Josephine, Lewis, Long Green, Muscat d'Allemagne, Napoleon, Neplus Meuris, Orange d'Hiver, Passe Colmar, Rondelet, Sickel, Wirtemburg.

Peaches—Alberge, or Yellow Rareripe, Columbia, Early Melocoton, Crawford's Late Melocoton, Crawford's Old-mixon, Freestone, Red Cheek Melocoton.

Almond—Bitter.

By A. T. Prouty, of Kalamazoo, Michigan.

Apples—Red and Green Sweeting, Harrison, Grannywinker, Juneating, Holland Pippin, Winesap, Winter Russet, Fall Spitzenberg, Esopus do., Hudson Streak, Pomme Grise, Seek-no-further, Russet Pearmain, Priestly, Brown Russet, Roxbury do., White Bellflour, Holton Sweet, Tart Bell, Fall Greening, Fameuse, Winter Queen, Jonathan, Baldwin, Maiden's Blush, Spice Sweeting, Pound Sweeting, King of the Pippins, Black Gillflower, Red Gillflower, Gates, Brandy Apple, Fall Red Streak, Winter Pippin, Campfield, Rhode Island Greening, Summer Queen, Monstrous Bellflower, Drap d'Or, Yellow Newtown Pippin. Twenty-four varieties of apples for names. One seedling apple.

Pears—White Doyenne, Beurre de Aremberg, Clement Sweet. Three varieties for names.

Plums—Red Gage, Apricot Plum. Three varieties for names.

One seedling peach of superior size and quality.

Daries.—The dairy business in this State is very extensive, and is annually increasing. The character of our butter and cheese is steadily improving, and it is not, I think, saying more than the truth will authorize me to say, that many of the dairies *are equal to any* in the world. Already the butter and cheese of our State are known and sought after wherever the stars and stripes are known, and the demand is annually increasing. From personal observation in England in 1846, I became satisfied that our cheese made for that market, similar in character to the English dairy cheese, would soon drive every foreign article out of the market; and I understand it has nearly accomplished this already, and the best of our cheese sent there nearly equals in price the very best English.

I had occasion, last year, (1847,) to make an examination as to the character of the *butter* made in this State to stand the test of tropical climates. From the accounts then received, as well as information obtained since, I became satisfied that, from a *very large portion* of the counties in this State, butter is made, in greater or less quantities, that will stand the test of climate the world over. It has been supposed by gentlemen having charge of the supply of butter for the navy and army, connected with the Navy Department, that the district of country from which butter could be made to answer the purpose was confined to the *county of Orange*, in this State. The accompanying statements, which are entitled to the most undoubted confidence, will dispel this illusion,

and will satisfy every one who reads, that the field in this State is vastly more extensive than a single county, from which can be produced butter that will stand a voyage to China, and some of which, after a voyage of four years in a whaling ship has been found in "as sweet and good condition as when made." I deem these facts of great importance to the country, and they deserve to be generally and widely disseminated. From the means of information I have of the manufacture of butter in this State, I can with safety say, that butter of this character, *as to its keeping qualities, is increasing every year.* The state society have for several years directed their attention to the improvement of the dairies of the State, and I am satisfied with the most auspicious results. To show what is the character and quality of butter made in some of the southern and western counties of New York, and its *adaptation to tropical climates*, the annexed extracts are given from letters from extensive dealers in butter in the city of New York, which deserve, as they doubtless will receive, consideration of those who are interested in the purchase of butter for use in warm climates. We think it cannot be questioned that it is here clearly established, that a very large portion of the butter marked "Goshen," in the New York market, is actually made *out of* Orange county; and it is but justice to the counties where it is made that credit should be given to those to whom it in justice belongs.

EXTRACTS FROM LETTERS.

"The butter made in the county of Chemung is equal to that made in Orange county, and will stand the *southern climate* as well. Also that made in Tompkins county is well suited for shipment south, and *stands the salt air as well as any butter we receive here.* I find that western dairies sell as well as the best 'Goshen butter,' *when sent south*, and in *many cases better*, as it has more color. Merchants sending butter south mark it 'Goshen,' without any regard to the place or locality of its manufacture; it is unavoidable doing so, as the southern merchant requires it."

From another letter:

"I have never had ——'s dairy, but have had many others in that place, (Chemung,) and one of my friends has had ——'s, and ——'s, and many others which I could mention, and a number of them have been sent south, to *my certain knowledge*, and they stand the climate *equal to any of the Orange county daries*, and they fetch as high a price as any of the Orange county."

The writer of the above has an establishment at New Orleans, where for a long time he has been in the practice of sending butter from Western New York, and is competent to speak with certainty, as he does, of its keeping quality.

From another letter:

Speaking of the manufacture of butter, it is said:

"The *defects* arise from the *manner of making*, *almost entirely*,

and but a small deduction is to be made from advantages of locality. I should think a Minisink (Orange county) dairy woman that I know, could go on a farm of natural grass and good water, and could make a dairy of 40 or 50 firkins, (for a large dairy is better than a small one, other things being equal,) in some *western spot*, that would be *a fac-simile in eating and keeping* with that she now makes in that place. In Mr. T——'s neighborhood (in Cayuga county) there are some dairies that keep very well, and more in Broome county, at a settlement of Orange county people. There are some good dairies in Chenango, but a great many more that are very poor."

This gentleman says he considers the butter made in Minisink the best; but, in his opinion, a dairywoman from that place could make a *fac simile* of the Minisink butter in some *western spot*, thus substantiating the position, that, as a general rule, it is the *manufacture*, not the *location*, that gives the preference so far as this State is concerned.

From another letter:

"In answer to your first inquiry, Whether butter made out of the county of Orange, and in the southern and western counties of our State, is so made as to keep in our southern and warm climates? we answer that generally it is not; but this is not necessarily the case. On the contrary, we have a large quantity of dairies made in the following counties that have proved nearly if not quite equal, both as to quality and style of packages, to the Orange county, viz: Chemung, Broome, and Chenango, produce a large number of strictly prime and choice dairies; especially is this the case with a large portion of the dairies made in Chemung county. There are a goodly number of dairies made in this county, varying in size, from 15 to 80 firkins each, that are not only equal, but there are those among them that in our judgment are superior. Broome county also produces some strictly fine, but not in so large a proportion of the quantity made; and so also is this remark true of Chenango, and those three counties produce the largest quantity of the quality and style described. Tompkins county and Tioga produce some few strictly prime dairies; and in fact there is *hardly a county* where there are not some strictly choice dairies made. The Welch produce some choice dairies, but their style is tubs instead of firkins, which is an insuperable objection for shipping."

"The C—— dairy, of which you write, is made in Chemung, and has passed through our Mr. D——'s hands for the last fifteen years, and has always proved superior, and never, we believe, with but one exception, has this dairy been sold for less than 18 cents, and for the most part it has brought 20 cents, and as high as 28 cents, the entire dairy; and in this county there are several dairies that have and do bear the same high character in the best sense of the term, and *will compare, to say the least, with the best that Orange does or ever has produced.*"

The annexed is from a letter received last July from an extensive dealer in Broome county, New York:

"I have not found time until now to look over the circular of the New York State Agricultural Society, relative to the manufacture of navy butter for foreign stations. What '*Irish rose butter*' is, I do not know; but 'that the milk must be thoroughly worked out, and the butter cleansed of all extraneous substances and be put up in good seasoned oak firkins, containing about 80 pounds each, well and strongly hooped, so as to be perfectly air and pickle-tight,' (these are the requirements for navy butter.) That each of these requirements is essential to the manufacture and preservation of *first rate butter*, every one who is conversant with the subject well knows; and if the *most perfect cleanliness* in the manufacture, the use of rock salt, and *the churning of the milk* had been required, I think the whole ground would have been covered. The idea that no butter made out of Orange county, will 'resist the action of tropical climates and preserve its qualities for years,' is an utter absurdity. I think that not *one-third* of the butter sold in market as '*Orange county*,' is made in that locality. That county has, during ten years past, sent out hundreds of emigrants to the counties of Sullivan, Delaware, Broome, Chenango, Tioga, Tompkins, and Chemung, and perhaps others in this State, who have continued the manufacture of butter for market, and who at the end of each season have been in the habit of transporting their butter in wagons across the country to the different points of shipment in Orange county, and there shipping it as 'Orange county.' Many of these persons had, for years before emigrating, regular purchasers in New York for their butter, who it was understood were to take their product each year when made, and pay the highest market price for it. These relations were, in many instances, continued for many years before emigrating from Orange county, and many now continue them, *without the least objection being made to the quality of the butter.* The term, *Orange county butter*, seems to be misunderstood. It does not mean (as I understand it) *the locality where made*, but a *peculiar method of manufacture.* The perfect neatness and cleanliness of everything about the dairies, the churning of the *milk*, instead of the cream, and the attention to the quality and quantity of salt, are the principal peculiarities. The churning the milk, I deem essential to butter intended for long voyages. It gives it a peculiar firmness and fineness of texture, and wax-like appearance when it is fractured, which butter made by churning the cream seldom or never has. These peculiarities can generally be detected by the eye. There is a cream-like flavor to milk-churned butter, which I have never found in butter manufactured in a different manner. I believe the highest price for dairies paid in New York for several years past has been paid for several dairies from Chemung county. Being at the table of a well known gourmand in New York, in the spring of 1847, I remarked the very fine quality of the butter. He replied, '*that such butter could not be made out of Orange county.*' The conversation continued, till finally the original firkin was brought up, when *I found it was branded, John Holbert, (premium.)* (*Mr. Holbert resides in Chemung county*, hundreds of miles *west of Orange county.*) This

gentleman told me he had his supply of butter of *this dairy for several years*, at an *extra price of* 33 *cents* per lb., of a particular grocer, who alone sold it. The opinion of 'the gentleman who has charge of the butter department of the United States navy,' that no butter made out of Orange county will resist the action of tropical climates, I *know to be erroneous.* A dairy made in this county (Broome) has been sent abroad much of the time for ten years past. In 1839, it was sold in St. Croix, to the governor, for 75 cents per pound. In 1840, it was sold in New Bedford, and went on a whaling voyage. I saw some of it after the *expiration of nearly four years* from its manufacture, *as sweet and in as good condition* as when made. The same dairy has since been sold in New Orleans, in Natchez, and Mobile, and there never has been any complaint made as to its quality. I shipped some butter that was the product of this county to Canton, in 1846, which, under very disadvantageous circumstances, *opened as fresh as when made*, and proved so good that the shippers *have each year since* applied to me for butter for cabin stores for their ships. I broke up the original firkins, and procured a quantity of small white oak kegs, which would contain from 15 to 25 lbs. each, and repacked the butter, selecting the best from a large quantity. These kegs when filled were put in very large hogsheads, and filled in the interstices with rock salt, and placed in the hold of the vessel. This butter when sold (about eighteen months after its manufacture) was in as good condition as when made. The small kegs were not used in reference to the preservation of the butter, but merely for convenience of retailing at Canton.

"The exportation of butter for the supply of the different cities along the coast of Asia, is probably destined to be a very considerable business. The entire supply for the immense cities in the possession of the British East India Company, being derived from Europe, (mostly from Ireland, but some little from Holland,) and it is usually purchased at home at a price which would fully pay an American shipper at its destination.

"The relative proportion of our counties that is adapted to the production of the finer qualities of butter, is probably as small as any other article of general necessity; but much of the southern tier of counties, and also of the central and northern portions of the State of New York, will, when well cultivated, produce the variety of grasses necessary to give butter the peculiar flavor and aroma of Orange county, when properly manufactured. The emigrants from Orange county, before alluded to, *all agree in opinion that as good butter can be made in their new locations as in Orange county.* Minisink is cited as being the locality producing the best butter in Orange county. A Minisink dairywoman in this vicinity, who had for many years the reputation of being *one of the best* in that town, made her first dairy of about 60 firkins here last season, and says *it was the best* she ever made. All the Orange county emigrants agree in opinion, (and many of them are farmers of much experience and close observation in their business,) that, in

favorable situations they *can produce as much butter and of as goodqua lity as in Orange county.*"

"J. J. H.

"Binghamton, *Broome Co., July* 24, 1848."

With these facts, and others of a similar character which could be produced were it necessary, we trust it is not too much to say, that "the district of country from which butter is made that will stand the test of climate and preserve its qualities for years," is not that limited one which has been supposed, confined to a single county, but embraces a very large portion of the State of New York. In the language of one of the gentlemen from whose letters extracts are given, "*there is hardly a county where there is not some strictly choice dairies made.*" If the skill of the Orange county dairy women is applied in other counties of the State, an equally prime article will be the result.

Mr. John Holbert, of Chemung county, whose butter had been purchased by the New York gentleman at 33 cents per pound, and used with so much gusto as *Orange county butter*, has often received the highest premium at our State and county shows. The present year it received the first premium at Buffalo, and also at the American Institute, New York. I annex a statement of his dairy; and also his method of manufacturing his butter, which will, I presume, be found of interest as well as of value to the dairy interests of our country.

Statement of the farm and dairy of John Holbert, of Chemung town and county. This farm is elevated about 800 feet above tide water, in 42° north latitude. Contains 200 acres. The past year 40 cows have been kept, and the land managed as follows:

24	acres of	wheat.
8	"	buckwheat.
10	"	oats.
20	"	corn and potatoes.
2	"	summer fallow.
40	"	meadow.
74	"	pastures.
22	"	wood and waste land.
200	acres.	

Soil, a gravelly loam, with a slight mixture of black sand; subsoil the same. No plants or slops for cows. All that is fed is hay, grass, and corn stalks. Pastures are clover and timothy; hay the same. Meadows produce from one to two and a half tons per acre. Plaster is used on the pastures and meadows every year. Several experiments in making butter have been tried the present season. Commenced making butter about the first of April, and, up to the 4th of May, made 512 pounds. May 5th, commenced packing for fall market, and closed 15th December. June 15th, drew the milk from 37 cows. Morning's mess 525 pounds; even-

ing's, 632 pounds; in all, 1,157 pounds, making 3 pounds 11 ounces of butter to 100 pounds of milk. June 20th, had three more cows come in, which made dairy full. Cows commence dropping their calves in March, and do not all come in until the middle of June. Do not rear all the calves, but usually keep the finest. Swine are kept to consume the butter-milk. Cows are generally the common breed; have a few that have a slight mixture of the Durham blood. Their ages range from three to twelve. Prefer a cow not less than five years old for the dairy, and as much older as she winters well. Change pastures often, and think it advisable to change twice a week. Too much care cannot be taken to have cows well watered and salted. Keep a large watering trough in cow yard, where the cows are observed frequently drinking large quantities of water immediately after coming from the brook. Salt is kept lying in the yard the year round. The cellar is thoroughly cleaned every spring. Milk is kept in one cellar; the butter in another. Too much care cannot be taken as to the time of churning. Usually churn from one hour to one and a half. Put from one to two pails of cold water in each churn before commencing to churn, and one pail more in each when nearly done, to thin the milk and make it produce all the butter it contains. When done, take the butter out, wash it through one water; then set it in the cellar and salt it; then work it from three to five times before packing; do not finish salting until the last working; then add a little salt, which makes brine that keeps the butter sweet. One ounce of salt to one pound of butter, is about the quantity that suits most people, or at least the butter buyers in the city of New York. The butter is then packed, if the weather is cool, the first day; if warm, the second day. If the milk is too warm when churned, the quantity of butter will be less, and the quality and flavor not as good as when it is cool at a proper temperature. Butter is worked by hand; used a butter worker last fall, but recommend the hand ladle as decidedly preferable.

Packing.—Fill the firkins to within two inches of the top; then lay a clean cloth on the top of the butter, and put salt on the cloth and keep it covered with salt and brine all the season. Great care should be taken not to let the milk stand too long before churning, as, in that case, in hot weather, it becomes too sour, and the butter will be sour also; and in cool weather it will become bitter, all of which can be prevented in cool weather by putting about one quart of butter-milk in each pan or tub before straining the milk, and in hot weather by churning as soon as the milk becomes thick and moist on the top of the cream. Use salt of the Ashton brand.

From 5 cows in 30 successive days—commenced 28th of May—made 248 pounds of butter. On 11th of June, drew from five cows 187 pounds of milk, which made $8\frac{1}{2}$ pounds of butter. Churn all the milk by horse power, and usually churn 4 $1\frac{1}{2}$-barrel churns at once.

On 8th of August, drew the milk from 40 cows in the morning, 508 pounds; in the evening, 519 pounds—in all, 1,027 pounds, which made 39 pounds of butter.

The morning's mess made 3 pounds 10 ounces from 100 pounds of milk. The quantity from each cow is as follows:

Number.	Morning.	Evening.	Number.	Morning.	Evening.
	Pounds.	Pounds.		Pounds.	Pounds.
1	14	13	21	12	13
2	10	11	22	11	13
3	13	12	23	13	14
4	14	13	24	12	13
5	13	13	25	11	11
6	14	14	26	11	12
7	13	14	27	9	8
8	15	14	28	13	14
9	10	9	29	15	16
10	12	12	30	14	14
11	13	14	31	18	15
12	16	15	32	12	13
13	11	12	33	13	14
14	11	12	34	16	15
15	13	13	35	10	12
16	14	17	36	13	15
17	14	11	37	10	10
18	12	11	38	14	15
19	13	13	39	12	12
20	12	13	40	14	14

On 11th of August drew the milk from 20 cows, weighed and churned it separately—result as follows:

No. 1	26	pounds milk	1	pound	8	ounces	butter.
2	25	"			10	"	"
3	27	"	1	"	6	"	"
4	28	"	1	"	2	"	"
5	30	"	1	"	2	"	"
6	23	"	1	"	4	"	"
7	31	"	1	"	8	"	"
8	28	"	1	"	1	"	"
9	27	"	1	"	1	"	"
10	26	"	1	"	3	"	"
11	28	"	1	"	12	"	"
12	24	"	1	"	4	"	"
13	29	"	1	"	14	"	"
14	19	"			14	"	"
15	16	"			12	"	"
16	17	"			8	"	"
17	21	"			14	"	"
18	33	"	1	"	15	"	"
19	31	"	1	"	[illegible]	[illegible]	"
20	31	"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The above table shows the difference between cows and milk.

On churning the milk separately, one of the best cows makes as much butter *as three of the poorest giving the same quantity of milk.* June is a better month for making butter than July or August. Made 107 pounds more butter from 37 cows in June than from 40 cows in July. One hundred pounds of milk drawn from best cows, giving richest milk, will make one pound more butter than 100 pounds of milk from the whole herd. There is still *more difference in quality* than quantity; one cow *well kept* is worth two poorly kept, for dairying.

	Pounds.
Commenced making butter 1st of April and made to 4th of May	512
Commenced packing 4th of May. In May—26 days—made	747
In June, 30 days	1,186
In July, 31 days	1,079
In August, 31 days	1,016
From September to December 15—3½ months	1,948

Sold butter, 30th November, for 23 cents per pound, in New York.

The whole amount of butter made and sold amounts to $1,492 24. This, over and above family use for eight persons, on an average, gives $37 30 per cow. Last year, same dairy sold in New York for 24 cents; went south, and stood climate well.

JOHN HOLBERT.

December 25, 1848.

Stock.—Every year gives additional evidence of the gradual improvement which is making in this State, in our cattle, sheep, horses, and swine. The exhibition at our last show was unusually large, and the splendid display of cattle, horses, and sheep, was the admiration of all. The short-horns and Devons are the most numerous of the improved breeds. In travelling through several portions of the State the past season, I was surprised to find such an extensive variety of improved cattle already introduced in the different counties. The Hereford and Ayreshires are introduced to some extent, and their numbers are increasing. The southern tier of counties, and the central and northern parts of this State, are well adapted to grazing, and large numbers of cattle are raised for market. It is believed, for those portions of the State, the Galloway and West-Highland cattle of Scotland, which stand at the head of the great Smithfield market for beef, are peculiarly well adapted. It is hoped that some of our spirited breeders will turn their attention to them, and introduce them into our State. I have no doubt myself, having seen them in their purity in England, and made myself familiar with their hardy and early fattening qualities, as well as the peculiar fineness of their beef, that they would form for those sections of our State the most valuable cattle that could be raised, and that it would not be long after their introduction before their beef would have the same pre-eminence here that it so justly obtains abroad.

Fattening cattle.—Some of our large farmers are beginning to make a business of stall-feeding cattle for the winter and spring markets. Short-horn grade steers, from 3 to 4 years old, generally are purchased from Ohio or the western counties of our State in the fall in good condition, and feed well until February or March, and then sent by railroad to the New York or Boston markets. It is believed that, with our Indian corn and root crop, this business will be made profitable. A very superior article of beef will be the result; and where this is fully understood, I think the price will yield a remuneration. As far as I learn of the experiments already made, the returns have been satisfactory; so much so that more extensive preparations have been made for continuing and increasing the business. This will prove eventually a very important business in our State. If the feeder can sell his cattle so as to return to him his capital invested in the purchase with interest, and obtain the market prices for his fodder and grain, the manure which he will obtain, will, on right application to his land, secure to him such increased crops as will make the business a profitable and desirable one. The change of things consequent upon the opening of the fertile and cheap land of the far west to our markets, in competition with our farmers, will compel them to adopt new methods of farming to obtain satisfactory returns, and among others I think the fattening of cattle will probably prove one of the most important.

Sheep.—We have some of the best flocks of fine-wool sheep in the country; and more care is being paid to the preservation of these flocks in purity. The low prices of wool have dampened the flock-growers some; but those who hold on steadily will doubtless in the end succeed as well as in most branches of farming operations. The Southdown and long-wooled sheep are receiving more attentention. The demand for Southdown sheep has been remarkably large the past fall, and I think this valuable breed for mutton will ere long be as popular in this country as it has long been in England.

Wool depots.—The utility of these establishments has been proved I think, and they will, I should hope, be sustained, and prove beneficial to the wool-grower, as well as the manufacturer. The grower will be enabled to receive the full value of his wool, a part of which has heretofore gone to the agent who buys up the wool; and the manufacturer will be benefitted, as he can buy the quality he needs already prepared at the depot, and can afford to pay its full value.

Horses.—The attention which has been given for the last few years to the selection of thorough-bred stallions for service, is bringing forward a fine stock of young horses. In many of our counties the show of colts and young stock has excelled any exhibitions heretofore made. The market for first-rate horses in this State, is always a ready and profitable one, and the raising of first-rate horses will continue to be a very profitable business. It was supposed by many, that on the completion of our railroads the demand for horses would be much lessened. So far as my informa-

tion extends, the demand for first rate horses has never been better than for the past two years. The premium matched horses for the last three years have sold, I believe, at from $600 to $1,000.

Draining.—The importance of draining, in all good farming, cannot be questioned. Although without manure a farm may raise scanty crops, yet, where draining is needed, no crops will succeed unless it is performed. The instances where draining would prove beneficial, are far more numerous than is generally supposed. In this State much more attention is being given to it than formerly; and the results in the increase of crops most abundantly reward the farmers. Some spirited gentleman in Seneca county in this State, has ordered an improved drain tile machine from England, and they anticipate from its use the cheap manufacture of tiles, so as to bring them into very general use. I have no doubt our countrymen, on witnessing one of these machines, will be enabled to improve it, (if it should prove too expensive,) so as to bring the manufacture of tiles to such cheapness as to meet the wants of our farmers.

I submit brief extracts from reports from county societies, which will afford some indications of the feeling that is abroad in this State on the subject of agricultural improvement.

Cayuga county.—The president of this society writes, that the show of 1848 exceeded all others ever held in the county. From six to seven hundred head of neat cattle, and three hundred horses, were exhibited; the horses of superior excellence. From eight to ten thousand people in attendance. The president of the society came on to the grounds selected for the show with his wagon drawn by sixty-eight yoke of oxen from his own town; and thirty-six additional yoke from the same town were exhibited—making one hundred and four yoke of cattle from a single town. The improvements in this county are most cheering, and afford undoubted evidence that the right spirit is abroad.

Columbia.—Rye, corn, oats, wheat, barley, potatoes, hay, apples, pears, turnips, and other vegetables, are the principal products of the county.

Average	yield of	corn...............	40	bushels	per acre.
"	"	rye...............	20	"	"
"	"	oats...............	30	"	"
"	"	wheat.............	15	"	"
"	"	potatoes...........	150	"	"
"	"	hay...............	$\frac{3}{4}$	ton "	"

The grain averaged 5 per cent. better than in 1845—hay 10 per cent. less; the crop better than in '47.

Potatoes, partially diseased; disease made its appearance in the beginning of September, weather warm; *late planted* escaped in general. (This is against the general rule.) Average number of pounds butter and cheese per cow about 120 pounds. Fruit culture receives considerable attention; net proceeds per acre of good orchards, 500 bushels. Stock, Durham, Devon, and native; Durham cross considered the most profitable; the Morgan horse is preferred.

Genesee.—At the annual show there were exhibited one hundred and seventy-nine head of neat cattle—many full bred Devons and their crosses, and some short horns and their crosses. The Devons are the leading stock in this county. Sheep are mostly Merino, and a cross with the Saxons. The attendance of the farmers large; the society no longer an experiment, and few can be found who would be willing to give up the annual meeting.

Jefferson.—Of the agriculture of this county it is said the crop of spring wheat was remarkably good. The *Black Sea wheat* usually cultivated. This variety is less liable to rust and to the wheat worm than any other variety, and has a very good berry, and makes very fine flour. Winter wheat is less cultivated than formerly, owing to the ravages of the fly, (wheat midge.)

Indian corn.—Crop much larger than usual, and yield very good.

Oats.—Some very fine crops grown in this county. One crop reported of 110 bushels per acre, by measure, weighing 41 pounds to the bushel—a very extraordinary yield.

Fruit.—Much attention is being given to the culture of fruit; a very large number of orchards planted the past fall and spring. Many of the fall planting failed, while those set in the spring are healthy and flourishing.

The committee on farms examined twenty-four different dairy farms; on which were kept seven hundred and thirty-one cows, and which exhibited much care and attention.

Female influence and effort.—The president of the society in his annual address says: "In the successful prosecution of this highly honorable and peaceful pursuit, female influence and effort are indispensable to success. We may then appropriately appeal to *mothers* to teach their daughters to assist in early life in all the important and appropriate duties of the kitchen, so that they may thoroughly understand the practice thereof, as well as the parlor or drawing room. Strive to give them an education, solid, useful and practical, that shall fully prepare them to fill any appropriate and honored station to which they may be called. I am aware that some persons of near-sighted and contracted views have expressed the opinion that the female mind ought to be occupied altogether in the contemplation of unreal things, of ideas that float in a feverish or excited imagination, and of outward accomplishments, and be content to dwell upon the surface of subjects, without an attempt to dig deep in the mine of knowledge. No one honored with the title of mother can, for a moment, listen to any such suggestion; but will, I am sure, put forth their utmost exertion for the fullest expansion and enlargement of the intellectual and moral capabilities of their daughters as well as their sons."

Madison.—In Peterboro', in this county, C. D. Millie, esq., has a cow which gives from 60 to 66 pounds milk per day. He made from her milk in June, a very unfavorable week, fifteen pounds of butter; and for one week in 1847, he made from the milk of the

same cow $20\frac{1}{2}$ pounds. She was fed on hay, with a bushel of wheat shorts, and carrots occasionally. Mr. Chapman, of Clockville, in this county, has a two years old short horn heifer, calved 22d of June, which gives from ten to twelve quarts of milk per day, besides feeding her calf; and he has no doubt he can make from her milk twelve pounds of butter per week.

In De Ruyter, in this county, an agricultural department has been connected with one of their academies. From a letter from Professor Evans, who has charge of this department, I am informed that the most flattering expectations as to its usefulness is being realized.

Its primary object is to give thorough instruction to young men who desire to become truly scientific, as well as practical. The *farmers' course* will continue fourteen weeks, during which a regular course of study will be pursued, accompanied with daily recitations in "Johnson's Lectures on Agricultural Chemistry and Geology."

Two hours will be spent each day in the chemical laboratory, where students will be instructed in the constitution of soils and ashes of plants, with a minute examination of the properties of their ingredients, and the mode of testing for the presence of all the components of soils, ashes, &c.

A course of about thirty lectures will be given, during the term, upon the relation of geology to agriculture—the soil—the plant—the animal, and their various relations—rotation of crops—feeding animals—manures, draining wet lands, &c., &c.

Ontario.—The returns from this county show some excellent crops, as well as increasing attention to the farming interest generally.

Milch cows.—George Kier, of East Bloomfield, received the first premium on a cow, which produced nineteen pounds of butter in one week; and sixteen pounds per week for two weeks. In the first case, she was fed on corn stalks and middlings, with sour milk; the last two weeks, the same feed, with the exception of the sour milk.

Field crops.—Corn, 88 bushels per acre—eight-rowed variety; winter wheat, 48 bushels 19 pounds per acre, of Soule's wheat; barley, 55 bushels per acre; oats, 70 bushels.

Oswego.—The leading crops of the county are hay, oats, barley, corn, potatoes; and the dairy business is becoming an important interest. Indian corn succeeds well, and sixty bushels per acre is produced on land well tilled. Hay averages from one to two and a half tons per acre. Potatoes have suffered severely for two years past—say from one to two-thirds; yield from 150 to 200 bushels.

This county, from its location, (having Lake Ontario on one side, from whose waters a very salutary influence is given to the climate,) is admirably adapted to the growth of fruit. One gentleman writes that his orchard of 300 apple trees averages three bushels per tree, one year with another; and that the orchards are much im-

proved by the tillage of the land. Oats and potatoes do well as crops in the orchard.

Orange.—F. J. Betts, of Newburg, planted *potatoes* in his forcing house, and, upon digging them, several were found entirely rotted. This, he thinks, refutes some of the theories about the disease. The house was kept at as even temperature as practicable, without the *use of artificial heat*, and the ground continually moist; neither sudden alternation of heat, nor sudden changes from dry to wet, can be the cause of the disease. The soil is made three and a half feet deep, very rich, from an admixture of well rotted manure, muck and shell marl, and limed very heavily. Such are the facts, and they may aid in arriving at some just conclusion as to the disease.

At the annual show in this county, the fruit displayed exceeds any former year.

Crops.—Rye, 40 bushels; oats, 97½; corn, 80 bushels.

Queens.—Early part of the season, fine—latter, very severe drought. Potatoes, generally good; though the disease somewhat prevalent. Potatoes of a firm and solid character suffered the least.

Seneca.—It is gratifying to notice the increasing attention to farming in this county. Seven farms were entered for competition at the county show. (Having attended the show of the society of this county, and having viewed the farm that received the first premium, as well as several others, I can say that it will be difficult to find farms superior to many in this county. And they are farmed profitably, yielding, I think, from 7 to 10 per cent. on all the investments.) Lectures have been delivered to the farmers of the different towns by the president of the society, John Delafield, esq , accompanied with illustrations and experiments, which have been productive of the most happy results. Mr. Delafield was formerly a distinguished merchant and banker in New York, and for years exercised an influence as extensive, both at home and abroad, as that of any man in this country; but I venture the assertion that in the field he is now occupying, and which he has been in for some six or eight years, that of a *practical farmer*, he is exerting, and is destined, (if his life is spared, which I pray it long may be,) to exert a wider influence, and upon a more important class, (the agricultural,) than even he ever exerted in the times when his operations were most extensive, and reached to every commercial mart on the globe. His intelligence, his familiarity with science in its bearing upon agriculture, combined with his practical knowledge, will enable him to exert a most salutary influence upon the cause, not only in his own county and State, but throughout the Union. Mr. Delafield's farm received the first State premium last year, 1847, and an account of his operations will be found in our Transactions for 1847.

As a detailed statement will be furnished you from this county, I omit any further notice of its products.

Steuben.—The harvest in this county, a very abundant one; and the crops more than an average. Wheat, excellent in quantity and quality. Potatoes, large crop; but suffered considerably from disease. Butter, a surplus, the season for grass having been unusually favorable. Horses receive attention, and are very fine.

Suffolk, (*Long Island.*)—The early part of the season promising, giving assurance of a bountiful crop. Severe drought from middle July to last of August, diminishing greatly the usual yield of corn and buckwheat. The prospects of the society improving; prejudices against innovations upon practices handed down by tradition wearing away; all now anxious to pursue that system which gives promise of the largest reward for labor.

Sullivan.—The average of rye, 12 bushels; oats, 28; corn 25; potatoes, 120; hay, 1 ton; buckwheat, 20. Rye and buckwheat do not vary much from 1845, but 5 per cent. better than 1847. The oat crop of '47 and '48 falls 15 per cent. below the average. They grew uneven, and were injured by the rust. The season was unfavorable for corn. Potatoe crop rather improved. Disease did not make its appearance as early as formerly. *Maple sugar*, about the usual amount made. Butter is on the increase; most of the farmers make more or less for market, and the dairies rank equal to those of Orange county. Fruit receives much attention. Apples, 25 to 50 cents per bushel. Sheep, common variety, average 3 lbs. wool per head. Cattle—Durhams considered best for dairies; Devons for working cattle.

Ulster.—The interest in the operations of the society in this county is increasing. The crops on which premiums were awarded were Indian corn, 97 and 88½ bushels per acre; oats, 75 and 56 bushels; hay, 6,100 weight was raised (well cured) from one acre—the land, formerly, a barren swamp, reclaimed by ditching and under-draining.

Wayne.—The annual show was largely attended in this county; and the show of animals of all classes superior to any former exhibition. A very fine display of dairy cows; some giving for days in succession, 26 quarts of milk per day. They were mostly crosses between the Durhams, Devons, and natives.

Products.—Wheat, corn, barley, oats, rye, buckwheat, potatoes, pork, beef, mutton, wool, and butter and cheese, to some extent. The cheese, probably, does not exceed the amount needed for home consumption.

Average yield of grain, &c.: Wheat, 17 bushels; corn, 35; oats, 35; barley, 25; buckwheat, 18; rye, 12; hay, 1¼ tons. The per cent. is in favor of an increase, since 1845, from 5 to 10 per cent., save buckwheat and potatoes.

The crops, as compared with '47, are much better. Wheat is certainly one-third better. Corn—a much larger quantity will be shipped, owing to its fine condition.

It is generally thought the best preventive of the fly to the wheat

crop is increased richness of soil, and as late sowing as the 25th September or 1st October.

The *Mediterranean* wheat is not injured by the fly, and will be brought into general cultivation.

Of cattle: The native breed, the most common; and were half the pains taken to improve them, that there is the Devons and Durhams, they, too, would be an improved race.

Breeds of horses are numerous. Eclipse, Duroc, Messenger, imported Alfred, and Sampson, supply horses for various uses, for the road, and for the farm, and for all work.

Sheep.—Native, South Down, Colswold, Merino, and Saxon. Natives shear about $2\frac{1}{4}$ lbs.; Downs, 4 lbs.; Colswold, $3\frac{3}{4}$; Merino, $3\frac{3}{4}$; Saxon, 3 lbs.

Potatoes—150 bushels per acre. They have been less diseased the last two years. It made its first appearance 1st of August. The weather wet and cool. *Early planting* most successful.

Quantity of butter and cheese made about 1,800,000 lbs.—300,000 of which only is cheese. Average of butter per cow, 100 lbs.; cheese, 200 lbs.

Fruit.—Apples.—Great attention paid to culture. Over 30,000 bushels have been marketed during the year 1847. Not as many the present season. Apples of this county very superior, and are sought after from abroad. Price is from 2*s.* to 2*s.* 6*d.* per bushel, which will make the net proceeds of a good orchard $100 per acre. The land for other crops would be diminished from one-quarter to one-half.

Monroe.—The annual exhibition very good.

Corn—118. Mangel Wurtzel $1,311\frac{1}{2}$ bushels at 60 lbs. to the bushel. Fruit in this county remarkably fine.

Niagara.—More interest than ever before manifested in the progress of the society.

Butter—14, $13\frac{3}{4}$, $13\frac{1}{2}$, 13, $11\frac{1}{2}$, $10\frac{1}{2}$ and 10 lbs. per week per cow.

Wheat—44 bushels on a piece of 9 acres and 62 rods; 31 bushels on a piece of 20 acres.

Corn—110, 72, 71 and 59 bushels per acre.

Oats—77 bushels per acre on a field of 9 acres and 20 rods.

Crops reported in 1848.—*Bushels per acre.*

Indian Corn—118, 114, 101, 83, 66, 99, 96, 88, 85, 82, 66, 110, 72, 71, 59.

Wheat—$48\frac{1}{2}$, 44, 43, 32, 33, $40\frac{10}{100}$, 31.

Barley—62, 60, 55, 48, 45, 36.

Oats—110, 75, 70, 61, 62, 64, 56, 64, $87\frac{1}{2}$, 77.

Buckwheat—41.

Peas—36

Carrots—966; Mangel Wurtzel, $1,311\frac{1}{2}$.

Hay—3 tons, 487 lbs. per acre; 3,100 per acre.

The foregoing contains as full statements as I am enabled to give at this time. From several of our county associations returns have not been received. The returns and statements, however, which I forward, will give as full a description of the agricultural operations of the year 1848, as will probably answer the general objects in view. From the efforts now making it is hoped we shall obtain a legislative enactment requiring statistical returns from each town annually through the assessors of the towns. This, should it be accomplished, will enable us annually to give a full view of the agricultural progress in the State.

I am, very respectfully, your obedient servant,

B. P. JOHNSON,

Corresponding Secretary N. Y. State Agricultural Society.

Hon. E. Burke,

Commissioner of Patents.

De Ruyter, *December*, 1, 1848.

Dear Sir: I send you, in answer to your circular, the following statement of the products of the county of Madison, New York:

1. For some years past we have been troubled with an insect, called the weevil, which has much injured our wheat crop; and the consequence has been, that our farmers have not sown as much as usual; the probability is that the amount raised this year will fall short of that raised in 1845, when the crop was 190,364 bushels.

The northern and central parts of the county have suffered the most; in the west and southwest the usual quantity has been sown, and the yield has been very good. There has been more spring wheat sown than winter. The time of sowing winter wheat, from the 1st to the 20th of September; and, of spring wheat—this depends on the season; at all events it should be sown as soon as the ground can be properly prepared in the spring. The amount of seed, per acre, is from 1½ to 2 bushels; time of harvesting, the last of July and the first of August.

I think that 18 bushels would be a fair average, per acre, of the winter wheat. The white flint is considered to stand the winter the best, though many other kinds are sown. Of spring wheat, the Black Sea is generally preferred. Our clay soils are considered rather preferable. Most of the wheat raised of late in this county is consumed by the inhabitants.

2. Barley has been a good crop this season—say 230,000 bushels, though not so much sown as last, but the yield has been much better. Time of sowing, from the 20th of April to the 10th of May; quantity of seed, per acre, from 2 to 3 bushels; time of harvesting, about 90 days from the time of sowing. About 25 bushels per acre would be a fair average. Two and four rowed are the principal varieties sown; the two-rowed is considered the surest crop.

Almost any soil that is not wet will raise barley. Seven-eighths

of the crop raised in this county is sent east; price from 50 to 75 cents per bushel at the canal, which passes through this county.

3. The oat crop in this county, the present season, has been unusually large—say 750,000 bushels. Oats may be sown any time from the 1st of April to the 1st of June. Early sown oats are considered the best; quantity of seed per acre, from 2 to 3 bushels. Various kinds are sown, but the white oat is the most common. Any soil, if properly tilled, will raise good oats. Most of the crop raised is consumed in this section, as our canal and stage horses require a large amount. Price generally 25 cents per bushel. Average yield, per acre, 40 bushels.

4. Previous to the coming of the weevil among us, rye was not much sown; but, since that time, the cultivation of this kind of grain has largely increased. The crop this year, I should think, would reach 12,000 bushels. Time of sowing, from the 5th to the 25th of September; quantity of seed per acre, from $1\frac{1}{4}$ to 2 bushels; time of harvesting, the last of July. About 15 bushels per acre would be a fair average. Sandy and slate, and almost any soils among us will bear rye. This crop is usually consumed at home. Price about 75 cents per bushel.

5. *Buckwheat.*—The crop of buckwheat this year has been larger than usual; the quantity raised has, no doubt, exceeded 10,000 bushels; time of sowing about the 20th of June; quantity of seed per acre from one-half to three-fourths of a bushel; time of harvesting in September; twenty-five bushels would be a fair average per acre. Light sandy soils are considered the best, though it will grow almost anywhere; usually consumed at home; price per bushel 50 cents.

6. *Corn.*—The most important crop raised among us is that of Indian corn; from 300,000 to 400,000 bushels, I presume, has been raised in this county the present season; time of planting from the 5th to the 25th of May; from six to twelve quarts of seed per acre, according to the fancy of the farmer. We generally commence harvesting the latter part of September, and continue as circumstances shall allow till finished. About 30 bushels would be a fair average per acre. We have many varieties of corn; and the farmers are somewhat partial to their own kinds. The small eight rowed yellow is thought by many to be the earliest, but I do not think that it will produce as well as the twelve rowed yellow. Some prefer the eight rowed white flint, which is a very good kind of corn. It is very difficult to determine which is the most profitable kind to raise. A gravelly loam, with a portion of sand, is considered the best soil for corn. It is very difficult to say what part is consumed at home. Price from 50 to 75 cents per bushel.

7. *Potatoes.*—We have been troubled for the last five years with what has been called the rot among our potatoes, and this year I think the worst of any. My opinion is that the crop in the county this year will fall short of 130,000 bushels. The cause of the disease among the potatoes, no satisfactory reason has as yet been given. Time of planting from the last of April to the 1st of June. I know of no fixed quantity of seed to put on an acre;

every farmer seeds according to his own judgment. Time of harvesting, the last of August and the first of September. I doubt whether the average in this county this year will exceed 50 bushels per acre, although it may. Opinions differ as to what kind of potato is the most successful; yet some kinds rot worse than others. I think that a dry sandy soil, not very rich, at this time and in this section, produces the best potatoes. Price this fall from 30 to 50 cents per bushel.

8. *Hay.*—Our hay has been rather a short crop for the last two years, owing to some cause not exactly understood. The grass will start early and look fine and promising for a short time, but when it should head out, not one in ten make their appearance. This last season has not been so bad as that of 1847. The crop has been all of 25 per cent. better. I think the crop of 1848 may be set down at $1\frac{1}{4}$ ton per acre, on an average. We generally commence our haying about the 1st of July. Price from five to ten dollars per ton.

9. *Flax.*—Since cotton cloths have become so cheap, the raising of flax has not been much attended to. I am not able to say what quantity is being raised at this time.

10. *Silk.*—At our county fair on the 13th and 14th days of September last, we had several samples of silk and cocoons exhibited of a very fine quality; but the amount raised in the county is not large.

11. *Sugar.*—A large amount of maple sugar is annually made in this county, of a very excellent quality; but I am unable to estimate the number of pounds annually manufactured; price, generally, from 6 to 8 cents per pound.

12. *Fodder.*—Since the failure of our crops of hay, farmers have made more use of their straw and corn-fodder, and have become satisfied that this kind of fodder is a most valuable substitute for hay, and the quantity now used is immense; it is considered equal in value for stock to one half of the quantity of hay.

13. *Rotation in crops.*—We usually plant corn on sward ground; next year barley or oats; and before the weevil; we sowed wheat in the fall, and in the spring sowed clover with herds grass.

14. *Peas.*—There may be 30,000 bushels of peas raised in the county this year; but the raising of peas is diminishing rather than increasing; time of sowing, as soon as the ground will admit; about 4 bushels per acre is the usual quantity sown; harvest, the last of July; 20 bushels would be a fair average per acre; price about as corn.

15. *Fruit.*—Of fruit we have a large amount, particularly apples, and some very choice varieties. The interest of late is very much increasing; from 2,000 to 3,000 barrels were probably sent to the eastern cities in 1847. In small fruits there is considerable attention paid to the culture of, in many parts of the county, and to very good success.

16. *Dairy.*—Butter and cheese are both largely on the increase, and the quality of the articles much improved; many of our farmers who have heretofore been much in the wool business have

disposed of their flocks, and gone into the dairy. Probable average per cow of cheese is 350 pounds, and of butter 125 pounds.

17. *Raising of stock.*—In that section of our county where they have gone the most heavily into the dairy business, they generally kill their calves at from 4 to 6 days old; consequently not much stock is raised, though in some sections considerable attention is paid to the raising of cattle; in 1845, the number in the county was 45,216, which is probably more than at the present time; yet in some sections of the county they raise as fine cattle as in any part of the State. I should think that of horses there are as many now raised as in 1845, when the number was 11,774.

18. *Sheep.*—There are some excellent flocks of sheep in this county, but since the growing of wool in the far west has been so extensively gone into, many of our wool growers have quit that business, and turned their attention to the dairy. I should think that the number would fall short of that of 1845, when it was 263,132; but an improvement has no doubt been made in the weight of the fleece; the probable average per sheep would be about 3 pounds; price from 24 to 35 cents per pound, according to quality and condition.

19. *Hogs.*—Of hogs we have many and of excellent breeds; there may be 30,000; average weight, when fattened, probably 275 pounds; for hogs that weigh 300 and over, $4 50 per hundred; under 300, less price.

20. *Bees.*—The interest taken for the last few years in the raising of bees is very considerable; but it is impossible for me at present to say to what extent it has gone. I know that some of my neighbors raise the most beautiful honey that I ever saw; it is done by a new process lately gone into, viz., by putting small caps or boxes on the tops of their hives, so that when the bees have filled them with honey, they can be removed without destroying the bees; price of honey per pound, usually 12½ cents.

21. *Manure.*—Manure from our barn-yards, stables, and hog pens, is the principal, though much gypsum is used, and to good advantage; and many of our farmers are making use of lime, ashes, and salt, to some extent.

22. *Labor.*—The prices of labor on our farms per month, for the season, is from ten to fifteen dollars; day labor from fifty cents to one dollar per day. Men at these prices are boarded. Mechanics' labor, from one dollar to one dollar and fifty cents per day; female labor from one dollar to one dollar and fifty cents per week.

23. *Market.*—Our market is on the canal, and as both the Erie and the Chenango canals pass through this county, no definite price could be fixed for transportation to market.

24. *Agricultural societies.*—Madison County Agricultural Society was formed September 21, 1841. Present officers are, President, Benjamin Enos, De Ruyter post office; Corresponding Secretary, Clement Least, Eaton post office; Recording Secretary, James Sims, Cazenovia post office.

25. Number of members probably one hundred and fifty. Amount paid for premiums, say two hundred and fifty dollars.

26. There was formed in the town of De Ruyter, in December, 1847, a society called the Farmers and Mechanics' Association of De Ruyter; this association is divided into three departments, agriculture, manufacture, and the arts and sciences. We number between forty and fifty members, and the probability is, that before another year expires we shall exceed one hundred. We have a constitution and by-laws; fees for membership fifty cents, and quarterly dues twenty five cents per member.

We have a very excellent library, made up of the best books we could procure in the city of Albany, on the subjects of agriculture, manufactures, and the arts and sciences.

We have a very good room fitted up in the building of the De Ruyter Institute, in which we hold our regular meetings on the first Thursday in each and every month, and during the winter season we meet every week, and discuss such subjects as shall have been proposed at a previous meeting.

Since the formation of our society, we, with the faculty of the institute, have succeeded in fitting up in the institution a department of agricultural chemistry, and a class is now being formed to pursue that study the coming winter.

Officers of the association—President, Benjamin Enos, De Ruyter post office; Corresponding Secretary, David Maine, De Ruyter post office; Recording Secretary, Wm. J. Ayer, De Ruyter post office.

27. *Weather*.—As to the weather, I can furnish only from my own book kept to enter the daily occurrences of my farm, kept in rather an imperfect manner, to give to you separate from the other portion of my entries; but I shall give it as concise as possible, and as it occurs in my day farm book, omitting as much as possible all that does not allude to the weather.

10th May. Commenced planting; half past 3, p. m., was stopped by the rain. 12th. Half past 2, commenced planting again, and the 13th, at half past 2, p. m., stopped again by the rain; it rained all the time till the morning of the 14th, when the hills were white with snow; finished planting on the 15th.

18th. Commenced planting another field; and on the 19th, it commenced raining about 4 o'clock, p. m., and rained moderately through the night. On the 20th, finished, although about 1 o'clock, p. m., we had quite a shower, and from that time till half-past 10, a. m. On the 23d, it rained a great part of the time.

I think that the large amount of rain that fell from the 19th to the 23d, prevented much of my corn from sprouting. I have no means of knowing the quantity of rain that fell.

June 6. Prevented from hoeing about 11 o'clock, a. m., by rain, which continued most of the afternoon.

June 7. Cold rain stopped us again from hoeing, and continued.

June 8. Cold and wet.

June 27. Stopped about 1 o'clock, p. m., from hoeing beans by rain, and it continued till 8 o'clock, a. m., of the 28th—one continued shower, flooding our cornfields and meadows in many places, and doing much damage.

July 21. Stopped from carting hay by a shower. I find again,

that, on the 22d, mention is made of the rain so lodging my oats, that fears are entertained that they will not fill well.

July 24. Finished mowing a certain meadow; but, on account of the rain, did not finish carting it in till the 29th.

September 5. Finished cutting a large field of oats; but, in consequence of the continued rains, did not finish carting them in till the 28th; in fact, through the month of October, there was seldom a day without rain.

November 4. It commenced raining; and, on the next day, it rained and snowed all day, and continued storming, with snow on the ground, till Thursday, the 16th, when we could resume our out-door labor.

Thus I have endeavored to give you the short and imperfect account of the weather as noted down in my day book. It makes rather an odd appearance, disconnected from the whole entries as made at the time. I have made no entry of rain, unless it affected some particular business *in which* I was engaged.

28. I have mentioned in the account of potatoe and wheat crops, and also in that of grass, the effects of blight and insects. The probable per cent. of loss, I am unable to say with any degree of certainty.

29. As to the cost per bushel of raising wheat and Indian corn, I can give you the expense of raising a field of Indian corn, containing 2 acres, 3 roods, 25 rods.

Expenses.

126 loads barn yard manure, at 12½	$15 75
Ploughing and fixing land	4 50
Planting	3 00
Lime, plaister, and ashes used at planting	2 55
Seed corn	85
3 times hoeing	10 23
12 bushels urate put on after hoeing	1 38
18 bushels plaister put on after the second time hoeing	2 75
Interest on land, at $50 per acre	10 88
	$51 89

Cr.

By 284 bushels corn, at 50 cents per bushel	$142 00
Deduct expense of cultivation	51 89
Profit	90 11

Cost per bushel of raising the above crop, a trifle over 18 cents. In this statement, I have calculated that the corn fodder will pay the expenses of harvesting.

BENJAMIN ENOS,
President of the Madison county Agricultural Society.

To the Hon. Edmund Burke,
Commissioner of Patents, Washington.

PORTLAND, *December* 20, 1848.

SIR: Enclosed I send you a part of the information you desired me to furnish you with.

I should have sent sooner, but it has been almost impossible to collect such information as I wished, from the fact that there has, for a long time, been a conflict of opinion as to the true manner of graduating the price of land in the northern and southern portions of the county to a more perfect equality, in raising our county and State tax. I had this influence to meet; many supposing it to collect statistics for that purpose.

I shall soon send the statistics of the exports and imports of this county.

Yours, respectfully,

E. S. BARTHOLOMEW.

Hon. E. BURKE.

No. 1.

SIR: Your circular requesting agricultural information was duly received. The difficulty of obtaining the desired information is such that I cannot give you as full detailed statistics as I could wish, or as the county of Chautauque might merit. But I hope that enough may be presented to give you a bird's-eye glance at the elements of wealth within this county.

Comprised within its limits are two geological formations; those known in the survey of the State of New York as the Portage group of rocks, which have their out-cross bordering on Lake Erie, giving their dip southerly, the abrasion of which composes the soil of that part known as the lake level. This group is comprised within the limits of the tertiary formation, in which there are very few fossil remains, and an imperceivable quantity of lime in any of its combinations. Hence you see why our wheat crops do not compare with some other districts in this State, without the application of highly stimulating manures, and lime, in some of its combinations, artificially. The hilly, or southern portion, is mostly upon the Chemung group, in which there is more lime found, consequent upon the greater quantity of organic remains, &c. Annexed is a meteorological table, as kept by David Eaton, esq., of this town, in which will be given the monthly mean temperature; also the state of the weather, and the amount of rain and snow. The snow was taken from snow gauge, and melted and turned into rain guage, and counted as rain. You will see by that what the general range of the year, ending on the 1st day of November, 1848, is.

Wheat.—On the level the wheat crop, as a whole, is better than for several previous years; there being but very little complaint from the effects of the fly or rust.

The crop for this year is 10 per cent better than in 1847, on the

lake level, where winter wheat is almost wholly sown. In the south part no winter wheat is sown, as the soil is somewhat moist—the frost destroying it; consequently, spring grain is sown. This season has been bad for that section, the rust destroying the most of the crop; so that this county may be said not to raise enough for home consumption this year.

The time for sowing the winter varieties is from the 10th of September to the middle of October. Spring, as early as the season will admit of; generally as early as the 1st or middle of April. The kind universally used for winter is the white flint, producing the best and most beautiful flour. The Italian, for spring sowing, seems best adapted, as it withstands our droughty seasons best. Our season for harvest is from the middle of July to the last of August. For average yield and price, you will refer to table of cost and profit per cent.

Barley.—The crop is less, as there is not so great a demand for it now as there has heretofore been, from the fact that a number of distilleries have closed, making the market dull. Heretofore, barley has been fed to hogs for fattening; but most of farmers have found that corn is much better and cheaper.

Oats.—Not far from 10 per cent. *plus*. They have demanded a good price; consequently the crop has been increased.

Rye.—The crop will average ten per cent. *plus* from last season, from the fact that the wheat crop has been much injured for two or three years past.

Buckwheat.—Very little raised. The crop is probably 25 per cent. less than last year.

Indian corn.—The crop this season has been a good one—full 100 per cent. over last year's crop. The foreign market, which has been opened by loss of the potato crop, and an anticipation of a continuance of that demand, in connexion with the high price of beef, has been a mighty impetus to the raising of this excellent grain.

Potatoes.—There are a few persons who have succeeded in raising sweet potatoes. They have to start them in a hot-bed, where they remain until the season has advanced to an even, warm temperature, when the sets are transferred to the plat prepared for them.

Common potatoes are again diseased to a great extent. The cause, to a great extent, seems to settle down on the single principle that I described to you last season; to wit, the worm. In my examinations the past season, I have found that the egg from which the worm hatches, is deposited at the root of the leaf-stalk, and enters and eats downward. If the worm commences early enough to eat down into the root before the potato ripens, disease is sure; but the contrary, if the potato ripens before his arrival there. I am also satisfied, from further observation, that on very rich soil, and a luxuriant growth of stalk, the insect will invariably deposite a greater amount of eggs than where the growth is more stinted.

Hay.—There is, probably, thirty-five per cent. more than last season. The season has been well adapted to the growth of grass. It will probably yield, on an average, one and a half tons per acre.

The amount of cultivated land in this county is two hundred and seventy thousand seven hundred and eighty-four acres. The most approved rotation of crops is quadrennial, commencing with clover, following with corn, oats, wheat, and seed with clover. Manuring on the clover, lay for corn, and turning it under.

Root crops—Such as carrots, beets, turnips, &c., are only raised in small quantities by some farmers.

Messrs. Risley are extensively engaged in the seed business, and by them the greater part in the county are raised. The average number of bushels per acre of beets is 600, worth 12½ cents per bushel; carrots, 900 bushels per acre—12½ cents per bushel; turnips are an increase over last year 33 per cent. Nothing definite as to average number of bushels per acre; value, 25 cents per bushel.

In *orcharding*, there is an increased attention in all the various kinds grown in this climate, to wit: apples, pears, peaches, plums, quinces, cherries, nectarines, apricots, &c. All the kinds above named are grown here in perfection. Small fruit is now taking the attention of amateurs and others who have leisure to give them proper attention. Along the shore of Lake Erie, the Isabella and Catawba grapes can be found in almost every person's garden. There is one gentleman who is now growing the Isabella for wine, from which he makes a very good article, selling from $1 50 to $2 per gallon.

Dairying.—There is an advance of 25 per cent. Perhaps there is no county in the State possessing greater natural advantages than this for dairying purposes—a salubrious climate, pure water, and a fertile soil, producing rich pasturage. In the cheese manufacture the most approved methods are used. Probably in the making of butter more radical improvements have been made within the year past; a better adaptation to withstand the salt or ocean air has been the great desideratum to be attained. Hence, every investigation which science could aid has been used to effect that object: as the manufacturing of butter from the milk as soon as drawn from the cows, thorough working, to clear it of milk when churned, without the aid of water, and the future keeping in an even, cool temperature, after so made, until it becomes solid from packing.

Horses.—The number, from the best information, is about 21,012, and value ranging from $60 to $150.

Cattle.—There has been a great increase within the past year. Average number 100,327, and are valued according to their dairy qualities and condition for beef. Good milch cows sell from $12 to $35 per head, and fat cattle from 4 to 6 cents per pound, live weight.

Sheep are on the decline; thousands are annually slaughtered for pelts and tallow.

Hogs are on the increase, conse[illegible] increase [illegible] dairying.

Probable number in the county, 50,000—worth, when fattened, from $3\frac{1}{2}$ to $5\frac{1}{2}$ cents per pound, dead weight.

Poultry only used for domestic purposes.

Agricultural laborers get from $8 to $12 per month; mechanics, from $15 per month to $1 50 per day. Female domestics, from $1 to $2 per week.

Our prices of transportation are governed by the lake trade. This season it is 15 cents per 100 pounds to Buffalo, and 20 cents barrel bulk. Whatever articles are sent from home to market, go via Buffalo to eastern cities.

There is an agricultural society in this county, and takes its name from the county. The date of its formation is 1836, having had an existence of twelve years. President for the ensuing year, Caleb J. Allen; post office address, did not learn. Secretary, Emory J. Warner; post office address, Sinclearville, Chautauque county, N. Y. Any communications to the President, directed to the care of the secretary, will be forwarded to the president.

The amount of premiums cannot yet be obtained, as the society have not yet awarded all. I will obtain them as soon as done, and forward you.

Time of corn planting is, with us, in the month of May; and by the annexed table you will see that a good deal of water fell, and the range was a low temperature. Being very cool and wet, the planting was much delayed.

Prevalence of blight or insects.—The blight is destroying the pear very rapidly; so much so that we shall soon be without that delicious fruit. The family of aphis is the only kind doing us much injury. Their depredations are alike in the orchards and gardens. Our losses from both causes are full 25 per cent. annually. In the following table of the cost of raising wheat and corn, I make no account for the drawing from the field, offsetting that for the manure made from the same.

We value our wheat lands worth $30 per acre.

Interest on land, at 7 per cent	$2 10
Plowing, per acre	1 00
Harrowing four times	2 00
Seed, $1\frac{1}{2}$ bushels	1 50
Harrowing	1 00
Threshing, $12\frac{1}{2}$ cents per bushel	2 25
	9 85
Average per acre, 18 bushels	18 00
Profit	$8 15

Average cost per bushel, 54 cents.

Our corn land we do not value so high, say $20 per acre.

Interest, at 7 per cent	$1 40
Plowing	1 00
Seed, 1 peck per acre	1 00

Planting	$0 75
Tending	2 00
Harvesting, 6 days	5 00
	11 27½
Average, 40 bushels	20 00
Profit	$8 72½

Cost per bushel is 5 cents 6¼ mills.

Respectfully submitted.

Yours, &c.,

E. S. BARTHOLOMEW.

Hon. Edmund Burke.

No. 5.

Abstract of meteorological observations made at Portland, Chatauque county, New York, for the year ending October 31, 1848, by David Eaton.

Month.	Monthly mean.	Highest temperature.	Lowest temperature.	Range.	Prevailing winds.	Quantity of rain.	Thunder.
1847.						Inches.	
November...	42.44	69	11	58	S. and W...	5.2	On 2 days.
December...	32.17	54	12	42	S. and SW..	6.45	
1848.							
January.....	32.8	59	7	52	S..........	2.78	
February....	28.9	45	8	37	W. and NE.	.75	
March	31.61	77	6	71	....do......	2.6	1 day.
April........	44.84	72	27	45	W. and SW.	1.35	2 days.
May.........	59.41	80	40	40	....do......	6.15	3 days.
June.........	67.166	86	46	40	SW........	4.	6 days.
July.........	68.87	86	54	32	..do........	5.85	12 days.
August	70.27	84	57	27	..do........	3.98	5 days.
September...	58.04	80	44	36	W. and SW.	6.86	3 days.
October	51.086	68	35	33	....do......	2.43	2 days.

Annual mean, 48.969°. Quantity of rain, 48.4 inches.
Highest temperature 86°. Robbins appeared March 15.
Lowest temperature 6°. Blue birds " " 19.
Annual range 80°. First butterfly " April 7.
Peach trees blossomed May 1. Swallow appeared April 22.

Trees were very uneven in foliating; more so than is usual in this latitude. Locust appeared August 2. Place of observation

two miles from Lake Erie. Elevation 200 feet above the lake. Thermometers kept in an open shed, six feet from the ground. Latitude 62° 21′ north, longitude, 79° 32′ west.

Annual means for five years.

Years.	Annual means.	Highest temperature.	Lowest temperature.	Range.	Rain—inches.	Remarks.
1843	45°.475	90°	—2°	92°	....	
1844	48.24	85	4	81	49.24	Mean of 5 years, 48°.097.
1845	48.817	88	1	89	46.59	Mean quantity of rain in 4 years, 48.395 inches.
1846	50.275	72	2	90	47.	
1847	47.18	90	3	87	50.75	

Binghamton, New York,
December 20, 1848.

Sir: I received your circular in due time. It is not practicable, with a reasonable amount of time and labor, to make the tabular statements which you desire. I think it could be done at a very small cost by the officers who will take the next census. I will attend to some particulars.

There is an agricultural society of this county, which distributes about two hundred dollars in premiums, besides forty volumes of our State Society's Transactions, and those of the American Institute: Jacob Morris, secretary, Binghamton post office.

The weather at early and proper planting time in this region was warm and dry, and diligent farmers got in their seed and had good crops. But a considerable portion did not plant until the latter part of May, on account of the intervening rain, or because their land would not admit of seasonable ploughing, and their crop was considerably diminished. There is no crop which seems to require seasonable or early planting as much as Indian corn. Though the season be sufficiently long between the spring and autumn frosts for its growth and ripening, they are more less sickly and imperfect, except in extraordinary fine seasons, unless the crop is rerdy for a fair start with the first summer weather.

The season was warm, with abundant showers, until the first part of August; after which, this whole State, except the western part of it, suffered from drought. The crops of hay, wheat, and corn, were gathered in good condition.

There was no unusual loss of crops by blight or insects.

The cost of raising corn and wheat, I gave you last year.

In regard to corn-fodder, I would remark that its value is greatly under estimated, and, as a consequence, very carelessly gathered

and saved. The corn should be cut up by the roots when the kernel is pretty well glazed, and set carefully up around an uncut hill of corn for its support; then bound near the top with wheat or rye straw. It should remain thus until the grain is fully ripened and the stalks and leaves thoroughly cured, and when the corn is husked, leaving as many of the husks on the stalks as is practicable. The stalks should be stowed away on the scaffolding, or other dry and airy parts of the barn. It is eaten with avidity by cattle, horses, and sheep; and if cut fine, and sprinkled with a little bran or meal, nearly all the stalks will be consumed, and is then worth two-thirds the price of hay. It is an entire mistake, the supposition that corn-fodder will be less injured by being imperfectly secured from the weather than the various kinds of hay. The saccharine and other nutritive portions are dissipated by rain and wind, and rendered both unpalatable and unwholesome by becoming sour and mouldy.

Potatoes are the chief root crop cultivated with us. The crop was not large, but more free from the rot than in any year since 1842.

Successful attention is much turned to the raising of fruit. Apples, pears, plums, cherries, grapes, &c., are raised to a good degree of abundance and perfection. Peaches do not flourish on our main river valley—the Susquehannah.

Butter dairies are beginning to furnish one of our staples for export, as well as a full supply for domestic use. Our rich, hilly pasturage, with good water, skilful and tidy dairy women, are proving the doctrine, that good butter making need not be confined to the stinted territory which was formerly assigned to it. The best mode is to churn the milk without skimming it; but some let the milk stand until it becomes sour, and others prefer to churn whilst yet entirely sweet.

Our farmers have not engaged largely in the making of cheese.

In raising stock, sheep, and hogs, improvements are being made.

Manures are not generally used, except barn and hog yard manures and plaster. Lime is too scarce and dear to become of general use, though our lands very much need it.

Wages, during the eight farming months, are from 10 dollars to 15 dollars per month and board, for farmers.

Transportation from 8 to 12 cents per bushel for grain, and about 40 cents per 100 pounds for barrels and gross freight, more or less, depending on canal tolls. Our market is New York.

I have lately noticed sound potatoes growing on unmanured lands, whilst those in adjoining manured fields, were almost ruined by the rot. Farther experience has satisfied me that early planting is one of the best modes of preventing the malady.

The productiveness of the potato is greatly diminished, not being much more than half as great as it was from 20 to 40 years since. I ascribe this fact to the habit of very many farmers of using the *smallest* potatoes for seed, erroneously supposing that, because they germinate well, and produce as *many* tubers as large ones, they are equally good for seed. The product of any seed

will be like itself; and I cannot well see why the potato should be an exception to the universal improvability of the productions of nature.

There has been too little attention to the quality and suitableness of soil and the mode of culture, and perhaps the too oft repetion of the crop on the same ground has too much exhausted the food of the plant.

With much respect, your obedient servant,

A. DOUBLEDAY.

Hon. Edmund Burke,
Commissioner of Patents.

Canton, St. Lawrence County, N. Y.,
November 28, 1848.

Dear Sir: In reply to your circular I forward the subjoined, respecting the county of St. Lawrence, in the State of New York.

The cultivated part of this county lies in the valley of the St. Lawrence river, on the forty-fourth degree of north latitude. Of course, you will expect here only such products as are common to high latitudes. In territory, this is the largest in the State, extending sixty miles on the St. Lawrence river, and running back from the river one hundred miles or more. About fifty miles in extent on the south end of the county, is an unbroken wilderness. Previous to the settlement of this county, the land was sold in large tracts to speculators. It has been retailed to settlers with all the evils attendant on that pernicious policy. To this day, many farmers feel, with agonizing sensibility, the oppression thus visited upon them. Of course, there is here considerable negligent and shiftless farming. Such farming is passed by in making the following estimate:

Estimated products for the year 1848.

Wheat	number of bushels	291,907
Barley	do do	250,110
Oats	do do	356,100
Rye	do do	222,375
Buckwheat	do do	38,450
Indian corn	do do	215,120
Potatoes	do do	960,580
Wool	number of pounds	232,950
Hay	number of tons	104,803
Sugar	number of pounds	806,092
Value of products of orchards		$13,950
Number of horses		12,500
Neat cattle	number of head	64,230
Sheep	do	77,650
Swine	do	46,360

The foregoing statistics have been collected with care, and are presumed to be as near accurate as the nature of the case will admit. The estimate, in every instance, is supposed to be rather below than above the fact.

At sowing and planting the season was warm and dry—just rain enough to cause seeds put into the ground to vegetate. Thermometer ranging about sixty degrees. Dry weather continued till the last days of June; then very wet, and, most of the time, warm. Thermometer ranging from seventy-five to eighty degrees to the first days of September. Occasionally a few days of chilly weather, thermometer sinking to forty degrees.

The *wheat* crop is estimated five per cent. larger than that of last year. The wheat sown is mostly spring wheat. It is of several kinds—more of the Black Sea wheat than any other variety. The winter wheat was considerably injured by the wheat fly; but spring wheat escaped their ravages. This escape was probably occasioned by the cloudy and rainy weather when the wheat was flowering. It is tolerably well ascertained that this insect does not work on the wheat in wet, cloudy days.

The average price of wheat, during the last year, has been one dollar per bushel. The average yield of wheat, on well cultivated land, is fifteen bushels upon an acre. In some instances 40, and even 50 bushels per acre are raised.

Barley.—The average yield of this grain is thirty bushels per acre, and the average price is forty cents per bushel.

Rye.—The average yield of this crop is twelve bushels per acre, and the average price is sixty cents per bushel.

Oats.—According to the best information I am able to collect, oats on an average yield forty bushels to the acre. The average price is thirty cents for a bushel. Frequently the produce of this crop is much more. Large fields often yield eighty bushels to the acre, and some pieces are known to produce one hundred bushels on the acre.

Buckwheat, in this section, is often called necessity grain; that is, it is sown at a time when no other grain can be sown, and generally on land where nothing else can be raised. The average yield is twelve bushels to the acre, and the average price is forty cents per bushel.

Indian corn.—The average yield of this grain on well cultivated ground, is forty bushels to the acre. The average price is fifty cents for a bushel. The variety planted is the small eight-rowed yellow corn. It is planted from the 15th of May to the 10th of June. It is estimated that the crop of corn this year is five per cent. better than it was last year. The most approved method of those who succeed the best with this crop, is to plant it in ridges two feet apart each way, with from three to four kernels in a hill. By extra manuring and other labor, large yields are sometimes obtained. I have known from one hundred to a hundred and sixteen bushels of good sound corn raised on an acre. The crows were formerly a great pest to the corn fields. As soon as the planted corn thrust its rising germ out of the ground, these freebooters would espy

the rising blade and pull it up; but within a few years, many farmers are in the habit of glazing their seed-corn with coal tar previous to planting it. The process is this: Put five or six quarts of corn into a half-bushel measure; pour on to this corn a few spoonfuls of this coal tar; then stir it with a stick until all the corn is coated with the tar; then sprinkle on it a few handfuls of slacked lime, and stir it till the lime covers the tar so that the kernels separate, and it is ready for planting. This is an effectual scare-crow. Crows never pull corn thus prepared, and will seldom light on a field planted with it until the corn is so large that they will not pull it.

Potatoes.—There is more complaint of injury and loss of potatoes by the prevailing disease this year than ever before in this county. Formerly, this was counted one of the best sections in the world for raising the common potato. Four or five years since, the potato crop was considered the most certain of any that farmers could raise. Potatoes were so easlly raised and yielded so abundantly, that our farmers have not to any extent cultivated any other root crops. From three to five hundred bushels were a common yield, and a much larger amount was often obtained—sometimes as high as eight hundred bushels on an acre. In quality, our potatoes were said to be among the best; but during several years past they have very much diminished, both in quantity and quality. It is estimated that the crop is fifty per cent. less this year than it was last. Many whole fields are given up as not worth harvesting. Other fields produce potatoes of a fair quality, but a smaller crop. The crop this year is estimated at one hundred bushels to the acre.

Potatoes planted as early as the middle of April on dry ground are nearly free from the rot. I selected three acres of side hill; broke it up in September; manured it with well rotted barn yard manure, at the rate of twenty loads to the acre, last fall; ploughed, harrowed, and fitted it for planting in the spring; and planted it from the eighth to the tenth of April. While planting, the weather became so cold that I had one man cover as fast as the other dropped the potatoes, lest they should freeze. The ground froze more than an inch deep; but the potatoes came up, and grew well. We finished hoeing them the last day of May. They then looked fine. That very night the frost killed them down to the ground. Again they grew to about the same height as before, and again the frost killed them down. They were hoed the second and last time the twentieth of June. They appeared tolerably well, but not as fine as at the first. About the twentieth of August, the tops indicated disease, and soon died down to the ground. They were dug the last of September. All the potatoes were fair, smooth, and sound, except where the manure was not thoroughly spread. In such places, there would be two or three rotten potatoes in a hill. I should not think there were three bushels of rotton potatoes on the three acres.

I attribute the disease to an atmospheric cause, and infer that my potatoes had so far matured before the disease commenced, as

not to be destroyed by it. But still it is difficult to account for the diminution of the crop. I had only two hundred bushels on an acre. On the same ground, with the same cultivation, five or six years ago, I should have expected a much larger crop.

Wool.—This business does not increase. Our climate appears unfavorable for sheep, and especially for the finest wooled kind. An average price for it cannot be given.

Hay.—This crop is supposed about seven per cent. less this year than it was last. The early part of the season was so dry as to retard the growth of the grass very much. Our haying time commences about the 4th of July. So much of the hay crop as was cut in July, was very light. On this account, many of the farmers delayed their haying till the last of August, and some even into September. Those who cut the latest obtained much the largest yield. The latter part of the season being very wet and warm, the grass grew rapidly. Two tons of hay were cut on many meadows in September, which it is supposed would not yield over half a ton to the acre in July. The average amount of hay in this county is one ton and a half to the acre. The average price is $4 per ton.

Sugar.—No other than maple sugar is made in this county. The quantity depends entirely on the season. This year and the last were both very unfavorable for making sugar. Very little difference in the two. In each of the last two seasons, there is a diminution of the sugar crop of at least seventy-five per cent. The quality is often equal to that of the best brown cane sugar. The average price is seven cents per pound.

Dairy.—Our farmers find that the dairy business is the best in which they can engage. The amount of butter and cheese made in this county is increasing every year. Much of both of these articles is of as good a quality as can be found in any section. But still there is a drawback. In several parts of the county, emigrants from Ireland and Scotland, in considerable numbers, who were unacquainted with the business, are engaged in making butter and cheese. They produce articles of an inferior kind. Their productions injure the price of that which is good; but they are improving, and, no doubt, will continue to mend. The average price of cheese last year was six cents per pound, and butter 12½ cents per pound. This year, the average price of cheese has been five and a half cents per pound, and butter fourteen cents per pound. With these prices, the estimated avails of cows is twenty dollars per head for this season.

Fruit.—Our climate is not favorable for most kinds of fruit trees. Apple trees grow well, but are so often killed by the sudden changes of weather, that little is done to increase or improve orchards. The amount of apples is something more than it was last year. Many complain that the apples are affected with decay, similar to what the potatoes are.

Horses.—Raising horses is more profitable than raising cattle. The price of horses varies with their quality. They are from fifty to a hundred and fifty dollars per head.

Neat cattle.—The price of neat cattle is from eight to ten per cent. lower than it was last year. The larger part of our young cattle are sold at two years old. The average price of such cattle is thirteen dollars per head. In the fall, after the dairy season is past, cows are worth from twelve to fifteen dollars each; and in the spring, they are worth from eighteen to twenty-five dollars per head. Working oxen are worth from fifty to a hundred dollars by the yoke.

During the summer, after shearing, sheep are worth one dollar a head. The common price of lean hogs is three cents per pound, and the average price of fresh pork is five cents per pound.

Labor.—The common price of farm labor for men is from ten to fifteen dollars per month in the summer season, and from eight to ten dollars per month during about four months of the winter season. The price of female labor is from seventy-five cents to one dollar per week.

Seeds for distribution.—I take the liberty to enclose two heads of wheat. It is spring wheat, and would, I think, be worth trying in many parts of the country, if it is not already generally known. Should you think it an object to distribute this kind of wheat from the Patent Office, and let me know it, I will another year send you, for that purpose, one barrel.

Obediently, yours,

H. S. JOHNSON.

Hon. Edmund Burke,
Commissioner of Patents.

The following report of J. Delafield, esq., president of the Seneca county Agricultural Society of New York, to the New York State Agricultural Society, is so valuable, and presents so fine a specimen of the aid which might be rendered in preparing this report, that although it has not yet been published in the Transactions of the New York State Society, it is believed they will not object to such a use of it, by which a wider extension of usefulness will be given to it, and in this point of view is accordingly placed here.

Oaklands, near Geneva, N. Y.,
January 3, 1849.

Dear Sir: In compliance with your request to furnish information in relation to the crops, &c., of this county, I transmit herewith the report recently prepared by me, as president of the Senca county Agricultural Society, for the State Society at Albany; it will give replies to all the queries in your circular, excepting only such as are annexed.

Respectfully, yours,

J. DELAFIELD.

Hon. E. Burke,
Commissioner of Patents, &c., Washington, D. C.

P. S.—Seneca county Agricultural Society formed under the act of the State of New York in 1841: John Delafield, president, Geneva post office, Ontario county; William R. Schuyler, secretary, Ovid post office, Seneca county—192 members.

Farmers' Association, Fayette, Seneca county: John Delafield, president; Alexander Rorison, secretary—35 members.

Though I keep a meteorological account of the year, my table is not so perfect as to present it. I may be able to transmit a very accurate table made from observations by a gentleman in this neighborhood.

Respectfully, J. D.

[Copy of the report transmitted by the president of the Seneca county Agricultural Society.]

To the executive committee of the
New York State Agricultural Society:

The agricultural condition of the county of Seneca through the past year (1848) has been much improved; the cultivation of the soil has received more careful attention than for many previous years, and the barn yards and manure heaps are better managed; a necessary consequence is cleaner fields, with larger crops.

Seneca county is more devoted to the cultivation of wheat as a principal product than any other grain, yielding annually about 550,000 bushels. The cultivation of Indian corn has increased within two years, and may be estimated this year at 400,000 bushels. The oat crop is unusually large, amounting to about 400,000 bushels. Barley is not extensively cultivated, but may amount this year to 120,000 bushels.

Heretofore the Hutchinson wheat has been preferred to other varieties, and fully maintains all its excellencies; the Soule's wheat has been much increased, and finds additional advocates from year to year. During the past season many farmers have cultivated a wheat from Ohio, which has yielded a good return, but needs more experience, to be adopted in competition with the Hutchinson or Soule's varieties. The product of this county in wheat will average about 20 bushels per acre, and as compared with the crop of 1845, the excess of this year is equal to 14 per cent.

The demand for Indian corn for export in 1847 has given an impetus to the cultivation of that grain hitherto unknown in this county. Until within a year or two it was a neglected plant, many farmers doubted the applicability of the soil to a full developement of corn; now, however, it seems that large crops yielding a high average are produced. The quantity raised in 1841 was 178,674 bushels; in 1845 we produced 205,000 bushels; and the crop this year is probably 400,000 bushels. The average yield per acre is 32 bushels, and fast increasing, as we have many farms which produce at the rate of 60, 75, and 80 bushels per acre.

The oat crop, as stated, is very large and good this year, the

opening spring having been very favorable. As an example, the town of Lodi produced in 1845 about 26,000 bushels of oats, and this year the crop in that town is 50,000 bushels. The adjoining town of Covert will present an equal yield of this grain. In 1845 the oat crop was 292,397 bushels; this year the county produces 400,000 bushels.

Barley has deteriorated in this region generally; the quality of the barley produced this year is believed to be inferior to that of last year, and the grain less in weight per bushel; the straw, when harvested, exhibited a shortness and feebleness unknown heretofore. This grain has not at any time been a favorite object of cultivation in this county, and probably receives less attention than is due to it. As a crop, it consumes from the soil a far greater amount of its riches than the more valuable wheat plants, yet by a proper cultivation the product per acre of barley may be raised so high as to give an equal profit with wheat, and prove a powerful aid to the farmer as a spring crop, occupying his ground little more than three out of 12 months. The deterioration of the seed in this section has induced the attempt to introduce, direct from England, the Cheltenham *barley*, which is a variety of the six-rowed, and said to weigh over fifty pounds per bushel at all times. The average yield of barley this year will not exceed 21 bushels per acre.

Rye is favorably cultivated in the towns of Junius, Tyre, and Waterloo, where our enterprising farmers have a lighter soil than other portions of our county. The crop exceeds the usual average about one-fifth; it is not large, as the more important articles of wheat and corn take a prominent precedence.

The very favorable state of the atmosphere during the spring months, and at the season of the hay harvest, enabled the farmers to secure more than an average crop of hay, probably one-third more than the previous year. An annual loss is incurred on this crop by the too late ingathering of the timothy hay. As the grass ripens here generally at the period of our wheat harvest, it is cut too late; that is, not until the seed has nearly ripened, and when the straw and leaf has parted with most of its nutritious power. Either a greater supply of agricultural laborers, or more perfect agricultural labor saving machinery, must be presented to remedy this annual loss. The crop this year may be estimated at thirty-eight thousand tons.

Buckwheat is raised to some extent, and frequently as a green crop for ploughing into the soil as a manure.

The potato crop has suffered much from the disease usually called the rot; a disease beyond the comprehension of any one in this section, and without any known remedy. There are several farms on which it has not yet made its appearance, while on the farms adjoining, it appears in its most destructive form. Neither the mode of cultivation, the composition of the soil, nor the position of the ground, nor the observations of careful men, offer any reasonable conjectures for results so widely different. The whole crop of the

county this year will not probably much exceed two hundred thousand bushels.

Flax has for many years been a source of early income, and the proprietors of oil mills have offered inducements for its cultivation. As, however, the exhaustion of the soil by this plant is from year to year better understood, the cultivation falls off—in several towns in this county it is wholly abandoned; for it is ascertained that the elements of flax make a heavier draft on our soils, for the growth of the plant, than any other, and without giving any compensating return; while, for its proper cultivation and full development, it requires a high degree of manuring, which can be applied with more enduring benefits to the cereal than to the oil producing seeds.

Much and increasing attention is given to the propagation and production of the best varieties of fruits; extensive orchards have been planted during this year, and more careful pruning of the older orchards has been practised. One of our excellent farmers in Seneca Falls has established a peach orchard of great extent, besides other fruits. Another enterprising farmer in Fayette has planted an extensive pear orchard; so, likewise, in every town in the county has every choice variety of fruit been cultivated and extended.

For many years the apples of Seneca county have found an extensive demand and ready sale in Albany and in the city of New York, at an average cost here of 25 cents per bushel.

There is one exception to the general and successful propagation of fruit: the plum trees have suffered severely; and in some places have been totally destroyed by the worm, which causes the unsightly excrescence commonly called here the "black blotch."

Timely care and pruning would probably have prevented this disaster, and we have reason to hope that our farmers will hereafter examine into and study the causes of such frequent and mortifying losses, most or all of which are inflicted by the insect tribe. And here I would state that we have, from time to time, suffered much from the Hessian fly, and the grain moth; their ravages have, in many instances, been extended to our crops of barley. The grub, and the wire worm, annually diminish the profits of many of our industrious farmers, and as often do we quiet our murmurs by the comfort of hope for exemption hereafter—a vain hope, unless we cautiously examine the habits and changes of the countless insects which naturally infest our fields and crops. This remark is called for, because notice has of late been drawn to the destruction of grass in meadows, wrongfully attributed to defect in the soil; for the insect aphis has been found in numbers beyond enumeration, all of them feeding on the herbage of the field. That the remedy is within the easy reach of the farmer there can be doubt; and there are many who, from precaution, do not suffer materially.

We owe many thanks to the several gentlemen connected with the State Agricultural Society for the information derived from them upon this subject, and indulge the hope that the agriculturists of this county will benefit by it, and in time add to the knowledge on record.

It may well be doubted whether any particular variety of wheat is exempt from the attacks of the insect tribe; the same variety which was reported to withstand their ravages during one season has fallen before them in another.

In this wheat growing region the dairy receives that attention only which will supply the farmer with the needful milk and butter for his establishment; and it may be stated that the county barely produces a quantity sufficient for the supply of its population. The product of butter in 1845 was 816,000 pounds, giving an average of about thirty-four pounds per head, per annum, to each inhabitant. The quality of the butter is generally excellent, causing a demand which will naturally affect a better supply.

The stock of Seneca county is good, the prevailing breed being the Durham or short horn, from stock imported from England; and also Devonshires. The cross of these cattle with native cows is found to produce good milkers.

Much attention is paid to the breeding and raising horses, and they improve yearly.

The sheep of this county are, for the most part, Merinos of fine wool; the fleeces average 3½ pounds each. The low prices of wool through the present year has induced many farmers to reduce the size of their flocks, a course probably improvident; for, upon a careful examination of the subject, we have reason to believe that a remunerating benefit can be derived even at present prices. More careful foddering of the flocks under shelter through the winter months, and more economy in the mode of feeding, will probably meet the difference in the market values of wool. The number of sheep in 1845 was 72,000; they now amount to 71,000.

Swine offer but little inducement for their propagation, except to consume the offal of the farm. The stock mainly consists of Berkshire, Byfield, and the common swine. Recently, a boar and sow direct from China have been introduced into the county, and a cross established with the Berkshire. The result is a breed called Tonquins; they have the small bone of the Chinese sow, consume but little food, lay on fat very readily, and at the age of fourteen months they average about three hundred pounds each, running at large.

The introduction of well constructed farm machinery and implements has undoubtedly contributed much to the improved condition of this county, and enabled the farmers to obtain larger profits by means of the great *saving of manual labor and of time.*

Among the most important of these machines is Hussey's reaping machine, many of which were used here, for the first time, during the last harvest. By the aid of this reaper, with the previous use of the cultivator named below, *several* farmers have been able *to raise* and prepare their wheat *for delivery*, in perfect order, at a cost varying from twenty six to thirty cents per bushel.

The cultivator alluded to was introduced among us by Mr. Tracy, of Newark, in Wayne county; it is an improvement on Ides' patent, which our farmers find an admirable implement; twenty-three were put into active use the past season.

The recent improvement in the plough by Mr. Burrall, of Geneva, and other men of sound scientific and mechanical knowledge, has materially abridged our labors in the field; while the stock feeder has been no less benefitted by the corn and cob crusher of Pitts & Sinclair, and the valuable portable grist mill of Ross & Co., of New York, by means of which the food for a large stock of cattle is prepared in a short time, as well as meal and flour for domestic use. Another advantage has been obtained from the use of Ross & Co.'s mill, by converting all the foul seeds collected from the wheat crop by the fanning mill into a highly nutritious meal and food for cattle, thus avoiding the reproduction of pigeon weed, cockle, summer grass, &c.

An attempt has been again made to collect the agricultural statistics of this county, under the auspices of the county society; the returns or reports from the several towns are transmitted herewith. They are not presented as entirely correct, and must be received as the nearest approach to the truth which can be had, until the legislature shall adopt the easy and more accurate method of annual returns from the whole State, through the instrumentality of the town assessors.

The great importance of information thus derived must be admitted by all; for it is the test and very foundation of the principles of political economy. It gives us the condition of our whole State, and the comparative advantages of each county. By this knowledge spread before us, we more readily avail ourselves of the benefits enjoyed by our sister counties, and impart to them any peculiar benefit possessed by our own. True, this is a very narrow view of the importance to be derived from official reports of the condition of our State; but even this renders it very desirable.

From the several town reports a table has been compiled, and herewith transmitted, exhibiting the principal products of Seneca county for the year 1848, the number of acres devoted to the several crops, the quantity of seed sowed per acre, the quantity raised per acre, and the cost of production per acre; from these data and others given, the profits derived from each crop are ascertained and noted both per acre and per bushel. In the estimation of the profits, neither rent or interest on the cost of the land has been included. Various valuable inferences may be drawn from a careful examination of this table.

Thus you have a general view of the agricultural condition of this county, which, if incorrect, will be found to err in the endeavor to undervalue quantities. The gradual improvement in cultivation is manifest, and a commendable strife for excellence and neatness in our agriculture is openly showed by very many of our excellent farmers.

The annual fair and cattle show did not draw out as large a number of our farmers as upon some former occasions; nor could it be expected that they would drive their cattle and other stock through roads rendered very heavy and wet by a continuance of rain for several days preceding the celebration; nevertheless, the exhibition

was highly respectable and interesting. The annexed report of the secretary will detail the proceedings of the society.

The treasurer's account and vouchers have been forwarded to the comptroller of the State, and exhibit an amount of cash received from members equal to $192 25, and from the treasurer of the State $74; making the aggregate receipts to be $266 25. The amount of premiums and expenses paid is $221 61; leaving a balance in the treasurer's hands of $44 64.

In conclusion, it must not be omitted to state that the distribution of the Transactions of the State Society is shedding a vast benefit on this county; they are sought with avidity, and perused with care and industry, causing discussions, and inculcating lessons not to be derived from other sources. This annual work from the State society has, in very many instances, provoked an appetite for agricultural and horticultural knowledge, and induced many to seek more frequent contributions of facts connected with farming, and thus has been the means of extending the thinking and reasoning class of men who examine the pages of the *Cultivator*, the *Genesee Farmer*, and other publications so zealously devoted to our farming interests.

From these sources science is made to confer lasting benefits upon us, driving away and steadily diminishing the misty baleful influences of ignorance and empiricism.

J. DELAFIELD,
President Seneca County Agricultural Society.

DECEMBER 30, 1848.

Estimate of the principal products of Seneca county, for 1848.

WHEAT.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.		
		Bushels.		*Bushels.*	*Per acre.*	*Bushels.*		*At 110 cents.*		*Per acre.*	*Per bush.*
Covert...........	4,000	2	Sept. 5 to 25	19	$9 00	76,000	$36,000	$83,600	$47,600	$11 90	$0 62.056
Fayette...........	7,200	1½ to 2	Sept. 10 to 25	20	10 00	144,000	72,000	158,400	86,400	12 00	60
Junius............	2,800	2	Sept. 5 to 25	20	5 00	56,000	14,000	61,600	47,600	17 00	85
Lodi	4,320	1 20-32	Sept. 5 to 20	19	9 00	82,080	38,880	90,288	51,408	11 90	62
Ovid	3,500	1½	Sept. 5 to 20	25	10 00	87,500	35,000	96,250	61,250	17 50	70
Romulus	3,500	2	Sept. 5 to 25	13	10 00	45,500	35,000	50,050	15,050	4 30	33.007
Seneca Falls	2,500	2	Sept. 5 to 25	20	10 00	50,000	25,000	55,000	30,000	12 00	60
Tyre	1,980	1½	Sept. 10 to 0	16	4 00	31,680	7,920	34,848	26,928	13 59	85
Varick............	3,300	2	Sept. 5 to 20	14	10 00	46,200	33,000	50,820	17,820	5 40	38.057
Waterloo	2,000	2	Sept. 5 to 25	13	9 00	26,000	18,000	28,600	10,600	5 30	4.007
	35,100					614,960	314,800	709,456	394,656		
BARLEY.											
								At 50 cents.			
Covert............	250	2	May 1 to 10	20	4 00	5,000	1,000	2,500	1,500	6 00	30
Fayette	1,100	2	May 1 to 10	20	6 00	22,000	6,600	11,000	4,400	4 44	20
Junius............	700	2½	May 1 to 10	25	3 00	17,500	2,100	8,750	6,650	9 50	38
Lodi	576	2	April 20	25	3 50	14,400	2,016	7,200	5,184	9 00	36
Ovid	80	2	May 1 to 10	25	6 00	2,000	480	1,000	520	6 50	26
Romulus...........	575	2½	May 1 to 10	25	6 00	14,375	3,450	7,187	3,737	6 50	26
Seneca Falls.......	700	2½	May 1 to 10	25	6 00	17,500	4,200	8,750	4,550	6 50	26
Tyre	990	2½	May 1 to 10	18	2 50	17,820	2,475	8,910	6,435	6 50	36
Varick.............	400	2½	May 1 to 10	19	6 00	7,600	2 400	3,800	1,400	3 50	18.042
Waterloo	400	2 to 3	May 1 to 10	15	5 00	6,000	2,000	3,000	1,000	2 50	16.066
	5,771					124,195	26,721	62,097	35,376		

ESTIMATE—Continued.

OATS.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.		
		Bushels.		*Bushels.*	*Per acre.*	*Bushels.*		*At 25 cents*		*Per acre.*	*Per bush.*
Covert	1,000	2	May 1 to 10	45	$4 00	45,000	$4,000	$11,250	$7,250	$7 25	$0 16.011
Fayette	2,000	3	May 1 to 10	35	5 00	70,000	10,000	17,500	7,500	3 75	10.075
Junius	800	3½	May 1 to 10	45	2 50	36,000	2,000	9,000	7,000	8 75	19.044
Lodi	998	2	April 20	50	3 50	49,900	3,493	12,475	8,982	9 00	18
Ovid	1,000	2½	May 1 to 10	45	6 00	45,000	6,000	11,250	5,250	5 25	11.066
Romulus	1,250	2½	May 1 to 10	37	6 00	46,250	7,500	11,562	4,062	3 25	8.078
Seneca Falls	800	2½	May 1 to 10	38	6 00	30,400	4,800	7,600	2,800	3 50	9.020
Tyre	1,188	3	May 1 to 10	25	2 50	29,700	2,970	7,425	4,455	3 75	15
Varick	1,000	2½	May 1 to 10	37	6 00	37,000	6,000	9,250	3,250	3 25	8.078
Waterloo	700	3	May 1 to 10	32	4 00	22,400	2,800	5,600	2,800	4 00	12.50
	10,736					411,650	49,563	102,912	53,349		

RYE.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.		
								At 70 cents.			
Covert											
Fayette	900	1½	Sept. 1 to 15	12	3 00	10,800	2,700	7,560	4,860	5 40	45
Junius											
Lodi	10	1	September 30	13	7 00	130	70	91	21	2 10	16.015
Ovid											
Romulus											
Seneca Falls	50	2	Sept. 10 to 30	12	9 00	600	450	420	Loss.		
Tyre	110	1¼	October 1	13	3 00	1,820	420	1,274	854	6 10	46.090
Varick											
Waterloo	1,100	1⅙	Sept. and Oct.	14	3 00	15,400	3,300	10,780	7,480	6 80	48.057
	2,200					23,750	6,940	20,125	13,215		

BUCKWHEAT.

Covert	250	¼	July 1 to 10	22	3 00	5,500	750	At 50 cent 2,750	2,000	8 00	36.036
Fayette	2,500	¼	July 1 to 6	18	3 00	45,000	7,500	22,500	15,000	6 00	33.033
Junius	50	½	July 1 to 10	10	2 00	500	100	250	150	3 00	30
Lodi	288	¾	July 1 to 10	20	3 00	5,760	864	2,880	2,016	7 00	35
Ovid	160	½	July 1 to 10	23	4 00	3,680	640	1,840	1,200	7 50	32.066
Romulus	250	½	July 1 to 10	20	4 00	5,000	1,000	2,500	1,500	6 00	30
Seneca Falls	150	½	July 1 to 10	22	4 00	3,300	600	1,650	1,050	7 00	31.080
Tyre	200	¾	July 1 to 0	10	3 00	2,000	600	1,000	400	2 00	20
Varick	200	½	July 1 to 10	19	4 00	3,800	800	1,900	1,100	5 50	28.094
Waterloo	300	[illegible]	July 1 to 10	8	3 00	2,400	900	1,200	300	1 00	12.050
	4,348					76,940	13,754	38,470	24,716		

INDIAN CORN.

Covert	1,100	¼	May 10 to 30	30	8 00	33,000	8,800	At 45 cents. 14,850	6,050	5 50	18.033
Fayette	3,000	½	May 1 to 8	30	7 00	90,000	21,000	40,500	19,500	6 50	21.066
Junius	1,000	¼	May 10 to 20	45	5 00	45,000	5,000	20,250	15,250	15 25	31.066
Lodi	1,122	¼	May 10 to 30	38	9 00	33,660	10,098	15,147	5,049	4 50	15
Ovid	1,100	½	May 10 to 30	38	7 00	41,800	7,700	18,810	11,110	11 00	26.058
Romulus	1,000	½	May 10 to 30	35	8 00	35,000	8,000	15,750	7,750	7 75	22.014
Seneca Falls	750	½	May 10 to 25	28	8 00	21,000	6,000	9,450	3,450	4 60	16.042
Tyre	1,584	¼	May 10 to 15	30	6 00	47,520	9,504	21,384	11,880	7 50	25
Varick	1,100	½	May 10 to 25	25	8 00	27,500	8,800	12,375	3,575	3 25	12.063
Waterloo	1,000	½	May 10 to 30	35	7 00	35,000	7,000	15,750	8,750	8 75	25
	12,756					409,430	91,902	184,266	92,364		

ESTIMATE—Continued.

FLAX—FOR SEED ONLY.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.		
		Bushels.		*Bushels.*	*Per acre.*	*Bushels.*		*At 1 dollar.*		*Per acre.*	*Per bush.*
Covert	200	¾	May	8	$4 00	1,600	$800	$1,600	$800	$1 00	$0 50
Fayette	200	1½	April	12	5 00	2,400	1,000	2,400	1,400	7 00	58
Junius											
Lodi	212	¾	May	7	3 00	1,484	636	1,484	840	4 00	57.014
Ovid	100	½	May	8	6 00	800	600	800	200	2 00	25
Romulus											
Seneca Falls	60	2	April	10	5 00	600	300	600	300	5 00	50
Tyre											
Varick											
Waterloo											
	772					6,884	3,236	6,884	3,548		

HAY.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.		
				Tons.	*Per ton.*	*Tons.*		*At 5 dollars.*			*Per ton.*
Covert	2,500			1½	1 00	3,750	3,750	18,750	15,000	6 00	4 00
Fayette	5,000			1½	1 00	7,500	7,500	37,500	30,000	6 00	4 00
Junius	1,000			2	1 00	2,000	2,000	10,000	8,000	8 00	4 00
Lodi	2,880			1⅓	1 00	3,840	3,840	19,200	15,360	5 33	4 00
Ovid	2,000			1½	1 00	3,000	3,000	15,000	12,000	6 00	4 00
Romulus	2,250			1½	1 00	3,375	3,375	16,875	13,500	6 00	4 00
Seneca Falls	2,300			1½	1 00	3,450	3,450	17,250	13,800	6 00	4 00
Tyre	2,280			2	1 00	4,560	4,560	22,800	18,240	8 00	4 00
Varick	2,800			1½	1 00	4,200	4,200	2[illegible],000	16,800	6 00	4 00
Waterloo	2,500			1¼	1 00	3,125	3,125	15,625	12,500	5 00	4 00
	25,510					38,800	38,800	194,000	155,200		

POTATOES.

				Bushels.	Per acre	Bushels.		At $37\frac{1}{2}$ cents			Per bushel.
Covert	100	10	May	100	6 00	10,000	600	3,750	3,150	31 50	31.050
Fayette	500	15	May	100	6 00	50,000	3,000	18,750	15,750	31 50	31.050
Junius	300	8	May	30	7 00	9,000	2,100	3,375	1,275	4 25	14.025
Lodi	71	8	May	$95\frac{2}{3}$	6 00	7,365	462	2,762	2,300	29 87	31.023
Ovid	150	18	May	106	6 00	15,900	900	5,962	5,062	33 61	31.083
Romulus	250	15	May	150	7 00	37,500	1,750	14,062	12,312	41 24	32.082
Seneca Falls	250	18	May	95	8 00	23,750	2,700	8,906	6,906	27 60	29.007
Tyre	140	10	May	160	5 00	22,400	700	8,400	7,700	55 00	34.037
Varick	250	15	May	95	6 00	23,750	1,500	8,906	7,406	29 62	31.018
Waterloo	300	12	May	85	5 00	25,500	1,500	9,566	8,066	20 22	31.060
	2,317					225,165	14,512	84,436	69,924		

ROOT CROPS.

								At 25 cents.			
Covert											
Fayette											
Junius	10		July	50	2 50	500	25	125	100	10 00	20
Lodi											
Ovid											
Romulus											
Seneca Falls											
Tyre	10		June 10	110	3 00	1,100	30	275	215	24 50	22.027
Varick											
Waterloo											
	20					1,600	55	400	345		

ESTIMATE—Continued.

POD FRUITS.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.		
		Bushels.		*Bushels.*	*Per acre.*	*Bushels.*		*At 1 dollar*		*Per acre.*	*Per bush.*
Covert											
Fayette	200	½	June	13	$6 00	2,600	$1,200	$2,600	$1,400	$7 00	$0 53.064
Junius	25	¼	May	20	3 00	500	75	500	425	17 00	85
Lodi	30	⅛	May	9	7 00	270	210	270	60	2 00	22.022
Ovid	50	½	June	20	6 00	1,000	300	1,000	700	14 00	70
Romulus	50	½	June	20	6 00	1,000	300	1,000	700	14 00	70
Seneca Falls	75	½	June	18	6 00	1,350	450	1,350	900	12 00	66.066
Tyre	25	½	June 1	10	5 50	250	138	250	112	4 48	44.080
Varick											
Waterloo											
	455					6,990	2,673	6,970	4,297		

GRASS SEED—CLOVER.

Towns.	Acres cultivated.	Quantity of seed per acre.	Time of sowing or planting.	Quantity raised per acre.	Cost.	Whole quantity in 1848.	Whole cost of the crop.	Value at the market rates.	Profit.	Per acre.	Per bush.
		Quarts.						*At 3 dollars.*			
Covert	500	6		2	3 00	1,000	1,500	3,000	1,500	3 00	1 50
Fayette	1,000	10 to 12	Spr. & autumn.	2¼	3 00	2,500	3,000	7,500	4,500	4 50	1 80
Junius	500	6	April	3	3 00	1,500	1,500	4,500	3,000	6 00	2 00
Lodi	1,008	5		2 1-6	3 00	2,033	3,024	6,099	3,075	3 05	1 51
Ovid	300	12 to 16lb	Mar. & April	3	3 00	900	900	2,700	1,800	6 00	2 00
Romulus	1,000			2	3 00	2,000	3,000	6,000	3,000	3 00	1 50
Seneca Falls	1,200	4 to 8 qt	March	2	3 00	2,400	3,600	7,200	3,600	3 00	1 50
Tyre	190	6	March 25	2½	3 00	475	570	1,425	855	4 50	1 80
Varick	500	6	March	2	3 00	1,000	1,500	3,000	1,500	3 00	1 50
Waterloo	150	8	Mar. & April	1½	3 00	225	450	675	225	1 50	1 00
	6,348					14,033	19,044	42,099	23,055		

ESTIMATE—Continued.

Towns.	Dried fruit.	Maple sugar.	Apples.	Pears.	Butter.	Cheese.	Poultry.	Eggs.	Hives of bees.	Honey.
	Bushels.	*Pounds.*	*Bushels.*	*Bushels.*						*Pounds.*
Covert	2,000	2,500	8,000	500	90,000	7,000	8,000	80,000	450	10 000
Fayette	500	500	10,000	500	150,000	6,000	10,000	80,000	300	5,000
Junius	200	....	20,000	500	2,000	500	5.000	25,000	100	2,400
Lodi	2,400	2,850	10,000	720	57.600	3,000	7,200	51,840	576	17,280
Ovid	300	400	10,000	500	65,000	3,000	2,200	17,000	200	3,500
Romulus	....	....	....	....	80,000	4,000	2,300	16,000	....	....
Seneca Falls	250	1,000	12,000	....	82,000	7,500	2,100	20,000	100	1.500
Tyre	230	1,500	2,000	200	93,600	1,500	2,178	26,000	198	3,900
Varick	....	....	....	....	70,000	2,000	2,000	15,000	....	....
Waterloo	300	....	7,200	....	65,000	8,000	2,500	26,000	350	5,200
	6,180	8,750	89,200	2,920	757,200	42,500	43,478	356,840	2,274	48,780

Towns.	Cattle.	Sheep.	Horses.	Swine.	Manures.					
Covert	1,000	9,400	750	1,100	Barn yard.	....	....	....	....	....
Fayette	3,500	12,000	1,500	5,000	....do....	Plaster...	Lime.....	Bonedust.	Ashes ...	....
Junius	1,900	6,000	700	2,000	....do....	....do....	....	....	....	....
Lodi	1,466	7,800	720	600	...do....	....	....	....	....	....
Ovid	1,700	7,500	700	1,500	....do....	Plaster ..	....	....	....	....
Romulus	2,000	10,000	2,300	2,500	....do....	....do....	Lime.....	....	Ashes ...	....
Seneca Falls	1,500	5,000	700	2,500	....do....	....do....	...do.....	....	....	....
Tyre	1,575	2,800	400	900	....do....	....	....	....	Ashes ...	Muck....
Varick	1,800	6.500	750	1,700	....do....	....	....	....	....	....
Waterloo	1,200	4,000	500	3,500	....do....	Plaster ..	Lime.....	....	....	....
	18,341	71,000	9,020	21,300						

WAGES, WITH BOARD AND LODGING.

Towns.	Per month.	Per year.	Per day.	Per week to females.
Covert	$8 to $13	$100 to $120	$0 50 to $1 50	$0 50 to $1 25
Fayette	8 to 12	100 to 120	50	50 to 1 25
Junius	10 to 15	125	62½ to 1 50	50 to 1 00
Lodi	9 to 13	100 to 140	50 to 1 50	50 to 1 50
Ovid	9 to 13	100 to 141	50 to 1 50	50 to 1 25
Romulus	10 to 13	100 to 140	50 to 1 75	50 to 1 50
Seneca Falls	9 to 12	100 to 150	50 to 1 50	50 to 1 25
Tyre	8 to 14	96 to 140	50 to 1 50	50 to 1 00
Varick	10 to 12	100 to 140	50 to 1 50	50 to 1 25
Waterloo	10 to 12	108 to 140	50 to 1 00	50 to 1 25

AGGREGATE RESULTS AS TO SEEDS ONLY.

Kind.	Number of acres.	Quantity produced.	Whole cost of production.	Market value.	Amount of net profit.
Wheat	35,100	644,960	$314,800	$709,456	$394,656
Barley	5,771	124,195	26,721	62,097	35,376
Oats	10,736	411,650	49,563	102,912	53,349
Rye	2,200	28,750	6,940	20,125	13,215
Buckwheat	4,348	76,940	13,754	38,470	24,716
Indian corn	12,756	409,480	91,902	184,266	92,364
Flax	772	6,884	3,236	6,881	3,548
Grass seed	6,348	11,033	19,044	42,099	23,055
	78,031	1,716,892	525,960	1,166,309	610,279

Upon an examination of these results from seeds produced in Seneca county in 1848, it appears that the whole number of acres employed in the production of one million seven hundred and sixteen thousand eight hundred and ninety-two bushels is 78,033 acres, from which has been derived a net profit of $640,279. This shows an average net profit of $8 20 per acre, or 16½ per cent. on capital invested in lands thus employed, costing fifty dollars per acre.

North American Phalanx,
Monmouth county, N. J., December 2, 1848.

Dear Sir: I return herewith the form you politely sent me with such statistics as I could gather. The return is imperfect, but is as full as I could make it this year.

We have had quite a dry season, and somewhat cool in the early part, which has been favorable to small grain, and the yield is larger than usual.

Corn is of excellent quality, but the drought in August somewhat diminished the quantity.

Potatoes were planted in much larger quantity than usual, but the dry season prevented full growth, and the yield is small.

The peach business has been overdone, and there is consequently a reaction. I judge that there were not more than two-thirds as many trees planted last spring as the year previous.

I append an estimate of the cost of culture of several crops, premising that our land is a friable loam, and portions of it sandy. This is the general character of the land, and the tillage is consequently very easy.

14*

COMPARATIVE STATEMENT.

Corn.

Ploughing one acre of land	$1 00
Harrowing	40
Marking for corn	50
Planting	30
Seed, six quarts	15
Plowing crop four times	2 00
Interest of $50, value of land	3 00
50 loads of compost, at 50 cents is $25, $\frac{1}{3}$ for use of crop	8 33
The stalks pay for harvesting	
Cost of cultivating	15 68

One acre of corn and lands thus dressed should produce one season with another 50 bushels per acre; this would be, 31 3-5 cents per bushel, as the cost of raising corn.

Wheat.

Plowing and harrowing	$1 40
Sowing	20
$1\frac{5}{8}$ bushels seed	2 08
Harrowing in seed	40
Interest of $50 for use of land	3 00
25 loads of compost, at 50 cents, $12 50, $\frac{1}{3}$ used in crop	4 17
Cost of one acre	11 25

Land treated thus should yield one season with another 20 bushels per acre; this would be $56\frac{1}{4}$ cents per bushel as the cost of raising wheat.

Potatoes.

Plowing and harrowing	$1 40
Furrowing	40
Planting	1 50
6 bushels seed, at 50 cents	3 00
Cutting seed	1 00
50 loads compost, at 50 cents, $25, $\frac{1}{3}$ for use of crop	8 33
3 plowings	1 50
Digging and drawing in	4 50
Cost of raising	21 63

One acre should yield, say 100 bushels per acre. This is $21\frac{5}{8}$ cents per bushel.

Our rain gauge was not procured until 1st July, but we give the stormy days in each month, and the range of the mercury each month, during the year.

	Hours.	Range of mercury in 1848.				
			Morning.	Noon.	Night.	Mean.
Storming in Dec......	105	December.... 1848.	36	44	40	40
Do.....Jan.......	21	January......	32	39	35	35⅓
Do ....Feb.	66	February.....	27	37½	33	32½
Do.....Mar......	48	March.	31½	44	37	37½
Do.....Apr......	30	April.........	42	63	51	52
Do.....May......	66	May.........	55	74	64	64⅓
Do.....June.	30	June.	65	82½	70	71½
Do.....July......	42	July..........	67	83	72	74½
Do.....Aug......	24	August	65½	83	72	73½
Do.....Sept......	18	September....	57	75	61	65⅓
Do.....Oct	90	October......	50	62	64	55⅓
Do.....Nov......	30	November....	34½	46	40	40⅓
Quantity of rain fell from July 1 to December 1, 1848, is 14 8-10 inches.		Mean.......	47	61	52⅔	53½

There is no agricultural society or club in our vicinity, and the estimates are made up from the opinions of the best informed farmers about us and our own results of labor. Our association is an industrial and educational institution, on the joint stock principle, and was organized in the summer of 1843.

Each industrial department is committed to the charge of a group of laborers, and the groups are responsible to the executive council for the proper conduct of the business of the department.

Our labors are mainly agricultural: A certain rate of wages for labor, and six per cent. for the use of capital, is first awarded as a basis of cost, and the profit or loss after this is distributed pro rata to capitalist and laborer.

Each department is charged with the capital and labor employed in it, and each laborer and capitalist is credited with his contribution.

We thus have the means of determining with precision the results of our labors, and in two instances have marked the actual results thus.* I suppose, however, that our results will vary somewhat from the average of the country about us.

I am, very respectfully, yours,

CHAS. SEARS, *Secretary.*

Hon. Edmund Burke,
Commissioner of Patents.

I am unable to give the consumption of food per capita, but could do so after our annual settlement, say sometime in January next, if that will be in time.

C. S.

* We have a population of about eighty persons, and our property is about $40,000.

Lima, Delaware county, Pa.,
November 30, 1848.

Dear Sir: Your circular of queries respecting the agricultural crops, &c., received by the Delaware County Institute of Science, was referred to the undersigned, with instructions to furnish the desired information.

We regret that our present means will not enable us to comply with your request with a degree of precision which the importance of the investigation demands. Being practical farmers, however, and observers of the progress in the various subjects embraced in your circular within this county and vicinity, we are induced to believe the following remarks and estimates bear a close approximation to their true condition.

Our institution under the above title, of which honorable George Smith is president, and Minshall Painter is secretary, (post office address, Lima, Pennsylvania,) is the only one contemplated in your circular as "other industrial associations." No agricultural societies or farmers' clubs exist in the county. Our institution was established in the year 1833, and numbers at present 32 members. Its means consist of a hall, and valuable collection of specimens in natural history and other interesting subjects, together with spacious lots appropriated to the various purposes connected with the object of its formation, and in a fund arising from and sustained by donations, annual contributions of its members, proceeds of public lectures, exhibitions, &c., situated near the centre of the county, 14 miles south from Philadelphia. Devoted to the advancement of its members and the community generally in every useful knowledge, it commenced, in the year 1846, a series of annual exhibitions, embracing products of the county in all the leading pursuits of its citizens. Continuing to be sustained by our citizens in 1847 and the present year, their indefinite continuance is probable. The accompanying reports of the committees of arrangement for the last and the present year, will afford you more precise information of their scope and the result.

Our county adjoining that of Philadelphia, and having communication with that city by tide water, and a railroad on the north and also the south side, the enterprise of our citizens, however employed, is stimulated into action by the advantages of their situation. Gardening, milk dairying, butter dairying, grazing beef cattle, and agriculture, engage their attention, as they are located at a short or greater distance from that city. The value of land, consequently, diminishes as the distance from the city increases, from an average of $150 per acre to about $60. We assume $85 per acre as the average for the whole county. Numerous mill streams, of from twenty to thirty miles in length, and a fall of 350 to 550 feet, cross our county at a distance asunder of some three or four miles, affording a great amount of power to drive machinery. A large portion is already appropriated, and the balance gradually becoming so, and has concentrated in our county a large amount of manufacturing population, requiring the whole of many of our agricultural products for domestic consumption.

Our soil is of various qualities, included entirely within the primitive formation, except a strip of alluvial bordering the river Delaware. This is succeeded by belts of gneiss, mica, slate and serpentine, each three or four miles in breadth, lying northeast and southwest, followed by a broad zone of ten miles in breadth, characterized by several varieties of rock, generally modifications of gneiss, extending to the slate ridge south of the great primitive limestone valley of Chester county. Wholly destitute of limestone or marl, the natural condition of about two-thirds of our county, embraced within the gneiss and serpentine ranges, may be termed "thin," though not sterile, and owes its present productiveness largely to artificial means resorted to within the last twenty or thirty years. For the balance, nature has been less sparing of the elements of fertility; and the present productive capacity of the whole will probably equal any other district of equal area in the State.

Our vicinity to the city of Philadelphia, with its rapidly increasing demand for fresh provisions of every description, in connexion with the comparatively low price of beef cattle since the existing railroad facilities with the interior, has induced our citizens to extend the area formerly appropriated to dairying to nearly the whole surface of the county. Hence, the course of cropping the land has a direct reference to the production of the greatest amount of suitable provision for dairy stock. The natural grasses, so pre-eminently valuable for that purpose, are more injuriously affected by our usual droughts than the artificial varieties on ground recently cultivated; and experience has taught that an alternation of grain and grass crops will result in a greatly increased production of the latter.

Our agricultural system, moulded to our interest under these circumstances, will apply to all the adjoining counties appropriated to grazing dairy stock or beef cattle. It consists in the division of the farm of whatever size into six, eight, or more enclosures of arable land; one of which, after being depastured several years, is broken up in the autumn, winter, or spring, and planted with corn, followed by oats the succeeding year, by wheat and timothy seed in the fall, and clover seed in the ensuing March or April. The first year after the wheat is harvested, the field is appropriated to pasture; the second and third to hay crop; then to pasture until its turn for corn again. Every field taking its turn regularly. Thus three fields are at all times under cultivation, viz: one with Indian corn, one with oats, and one with wheat; three in grass for hay, including natural meadows, and the remainder, more or less, in pastures. Variations from the above occur to an inconsiderable extent. Potatoes occupy a portion of the corn or oats field, and are followed by wheat and grass. Wheat occasionally follows corn, without an intervening oats crop. Oats are occasionally, but rarely, sowed upon fresh turned sod ground, followed by wheat—both doing well. Buckwheat, in small quantities, also supersedes corn and oats on newly cleaned or intractable ground, and is followed directly by wheat and grass seed.

The latter sometimes is sowed with oats after corn and the wheat crop dispensed with. But these (except potatoes) are merely exceptions to the general course of cropping described above, and will account for the difference observable in the quantity of land appropriated to the three leading grain crops in the estimates below. Under the regular routine, or any of its variations, the manure is applied to the soil *at the time of sowing wheat and grass seed*, and also previously to planting potatoes. Other minor crops, sugar beets, turnips, sweet potatoes, &c., receive comparatively but little attention. The high price and difficulty of obtaining agricultural labor constrains our farmers to apply it on a system of operations coextensive with his limits, greater or less, that will be most productive in proportion to *the labor expended*, rather than the amount of capital invested. The system of farming, including the care of live stock, either dairy cattle or others, requires nearly a uniform amount of labor throughout nine months of the year, equal to that of two active men and a boy to each 100 acres of cleared land, at a cost as follows: wages for two men, nine months, at $12 per month each, $216; boarding, $6 each, $108; clothing and board for boy twelve months, $76 = $400, or $4 per acre.

In accordance with your wish to collect information respecting the "state of the weather at the planting season," &c., &c., we furnish below an abstract of a diary kept for the records of our institution. The *daily* indications of the thermometer, barometer, and rain guage, it is presumed, are not desired, and they are omitted. A few passing remarks on the crops, &c., are added, as more appropriately placed here than elsewhere.

The months of May, June, and beginning of July, 1847, were characterized by the most intense drought ever recollected here at that season, greatly injuring the crops of hay, grass, oats, potatoes, &c., followed by an universal quantity of rain until the end of the year. The corn crop revived under its genial effects, and produced an average yield. September, our seeding season, was very wet. The wheat crop, however, was well put in. Second crops of hay on the meadows abundant.

January, 1848.—The weather was moderate and pleasant; not a trace of snow, and but few cold days. Wheat crop continues to present a fine appearance. Cattle doing well. Mercury fell, on the 10th and 11th, to 20° and 21° Fahrenheit, at noon.

February.—Was equally mild, with but little rain or snow. Farmers ploughing extensively for corn.

March.—Commenced cold, with six inches of snow; disappearing on the 7th, with heavy rain. The remainder of the month mild. During the whole winter the ground had not been covered with snow beyond fifteen days.

April.—The weather very pleasant generally, and suitable for farming operations. Oats and potatoes planted early in the month, and corn from the 25th to the 30th. Grass backward, and wheat bearing a yellow, sickly appearance. Violent storm of snow from northeast from 9 o'clock, a. m., until 3, p. m., on the 19th; melting

freely, but covered the ground until noon on the 20th. Depth of rain during the month, including melted snow, 1.50 100 inches.

May.—Rain fell on thirteen different days; quantity not ascertained. Average temperature at noon 74° Fahrenheit. Mercury rose above 80°, at noon, on six days; and sunk to 63°. At noon on the 12th, thin ice witnessed. Vegetation very rapid, and agricultural prospects highly flattering; pasture early, and very abundant; wheat crop much improved in appearance.

June.—Light frost on the 1st and 13th; generally very warm and dry until the 19th. 2.65-100 inches rain fell on eight days during the month. Average temperature at noon 80°; extremes 90°, at noon, on six days; and below 70° on five days. Wheat crop ripened eight to twelve days earlier than the average time; commenced harvesting it on the 26th. Weather rather unfavorable throughout harvest—(rain fell on eleven days, from the 26th June until July 13th, with much dull, cloudy weather)—attended, however, with but trifling loss. Early sowed wheat yielded above an average in quantity, and of excellent quality; late sowed, light—both having suffered extensively by the Hessian fly, and slightly by lack of rain during the ripening of the grain. Grass crops excellent. Corn and potatoes doing well. Cherries abundant. Other fruits, cultivated and wild, promise a heavy crop.

July.—In portions of our county, a sufficiency of rain; in others, rather light, and earth dry. Rained on thirteen days; altogether, 3 23-100 inches. Average temperature at noon $80\frac{1}{3}$° Fahrenheit. The crop of hay was secured in excellent condition, and a full average quantity. Oats ripened from the 19th to the 25th, proving a full crop, and was also harvested in good condition. For corn and potatoes, the prospect is fair. Average crop of summer fruit generally; peaches very abundant, but early kinds are of indifferent quality.

August.—The weather during this month was very dry, and warm rain fell on the 11th 37-100 inch, and on all the month together only 45-100 of an inch. The average temperature at noon during the month was 82°; above 80° on twenty-one days; above 91° on the 16th and 18th. The lowest point reached at noon was 75°, on the 22d, 26th, and 27th. Wind east of south twenty-one days; east of north seven days. Crops of corn and potatoes nearly ripe—making a full average, though sensibly injured and diminished by the prevailing drought. North and east of our county, these crops have been far more extensively injured by aggravation of the same cause. Pastures nearly destroyed by drought and heat, except in natural meadows. Apples and peaches very abundant.

September.—The drought continued to increase in intensity until the 14th, when it was checked by 75 100 inch of rain, followed, on the 17th, by 67 100 inch. In all the month, rain to the depth of 1.75-100 inches fell on six different days. Average temperature at noon, on the first fifteen days, 76°; on the last, $64\frac{3}{4}$°—whole month, $70\frac{2}{3}$°. Mercury rose at noon above 80° on five days, and sunk below 60° on 4 days; highest ascension 85°, at noon on the 11th;

lowest depression, at noon, 54°, on the 23d. First frost observed on the 23d. First ice on the 28th. Earthquake at $10\frac{1}{2}$ o'clock, p. m., on the 8th—weather at the time fair, with light wind from southeast—no sound noticed. Farmers availed themselves generally of the rains on the 14th and 17th to sow their wheat crop, which vegetated satisfactorily. The pastures, though green from the effects of the same rains, are short, and a real scarcity generally exists.

October.—The weather during this month (except from the 18th to the 23d, very cool,) was mild, and very genial to the interests of the farmer. The wheat crop wears a promising appearance, though the early sowed, as was the case last year, are slightly attacked by the fly. Corn generally housed in good condition. Grain uniformly ripe and sound; estimated yield 45 bushels per acre. Potatoes generally gathered in August and September, to avoid the "disease;" a few remaining in the ground have been secured; all producing a fair crop; only a trace of the late destructive disease observed; scarcely a lot escaped entirely, yet no serious loss was suffered under any of the usual circumstances of soil, &c. Streams low, and pastures exhausted. Partial foddering commenced two weeks earlier than usual. Indeed, the whole season, in all its principal features, has anticipated, by ten to fourteen days, its ordinary character. Rain fell on nine days 4.48-100 inches; $2\frac{3}{4}$ of which on the 2d and 3d. Average temperature at noon on the first fifteen days $61\frac{1}{5}$°; last sixteen days 57°; whole month 59°; ditto at 9, 12, and 3 o'clock, $57\frac{3}{4}$; extremes, at noon, 75° on the 1st; 46° on the 19th. Crop of fall and winter apples very large, and quality fine. Very large quantity of cider made.

November.—The weather during November has been seasonable, though marked by considerable and sudden variations, presenting, however, the anomaly of the first and second fifteen days average temperature at 9, 12, and 3 o'clock, being *equal*—viz: 42°; average temperature at noon for the whole month $43\frac{1}{2}$°; extremes, 9, 12, and 3 o'clock, on the 4th and 30th, $49\frac{2}{3}$°; ditto, on the 11th, $31\frac{1}{3}$°; ditto, 28th, 34°; 9 o'clock, on the 5th, $60\frac{1}{2}$°; at 12 o'clock same day 45°. Aurora borealis on the 23d, 7 o'clock, p. m., followed on the 24th by general rain. Rain fell on seven different days; aggregate, 2.14-100 inches. The great snow storm in Virginia and New England, on the 18th, 19th, 20th, and 21st, presented to us a cloud, but neither rain nor snow. The earth slightly frozen on the 6th. A few drops of snow appeared on the 11th. The wheat crop has a very encouraging appearance generally, except a portion of the northern section of our county. The Hessian fly is found in nearly all sowed previous to the 20th of September.

Having given an outline of the conditions under which our agricultural operations are pursued, we proceed to furnish replies to the "queries" contained in your circular, premising that, as the operations in the several branches of business referred to continue some two months before they close, and the agricultural crops not generally threshed or measured until January, or later, nearly the whole will be based on estimation. And as no data exists for as-

certaining the product of 1847, that also will rest on estimation, with less probability of accuracy than that of the present year.

PRODUCTS OF THE SOIL.

Delaware county contains about 177 square miles of territorial area; equal to 113,280 acres, estimated to be appropriated and to produce as follows, viz:

Wheat, 7 per cent.; 8,000 acres, yielding 20 bushels per acre=160,000 bushels, at $1 15 per bushel..........	$184,000
Oats, 6 per cent.; 6,800 acres, at 35 bushels per acre=238,000 bushels, at 35 cents........................	83,300
Rye, ½ per cent.; 600 acres, at 15 bushels per acre=9,000 bushels, at 65 cents..........................	5,850
Corn, 8 per cent.; 9,000 acres, at 45 bushels per acre=405,000 bushels, at 60 cents........................	243,000
Potatoes, 1⅕ per cent.; 1,340 acres, at 100 bushels per acre=134,000 bushels, at 50 cents....................	67,000
Hay, 22½ per cent.; 25,500 acres, yielding 1½ tons per acre=38,250 tons, at $10 per ton....................	382,500
3,000 bushels clover and Timothy seed, at $4 per bushel..	12,000
Pasture, 30 per cent.; 33,984 acres pasture, at $9 43 per acre, assisted by second growth of hay ground......	320,610
Uncultivated land, 20 per cent.; yielding annually in timber and firewood equal to 1 cord per acre, at $3 per cord—22,656 acres..............................	67,968
Other root crops, ½ per cent.; 600 acres—turnips, sugar beets, sweet potatoes, and yielding produce at $50 per acre...	30,000
Small fruit, ¼ per cent.; 300 acres—strawberries, raspberries, grapes, cherries, plums, &c., at $150 per acre..	45,000
Orchards, &c., 4 per cent.; 4,500 acres, excluding nurseries, lawns, pleasure grounds, &c., at................	120,000
24,400 tons of straw and corn fodder—market price $7 per ton..	170,800
	1,732,026

Equal to $15 20 per acre.

ANIMALS AND THEIR PRODUCTS.

Our 90,000 acres of cleared land are estimated to support 20 head of cattle and horses to each hundred acres—say 18,000 head, as follows, viz:

3,600 working horses and cattle.
2,400 beef cattle under process of fattening.
1,800 young stock and bulls.

1,700 milch dairy cows.
8,500 butter dairy cows.

18,000

(This estimate excludes all animals not appropriated to agricultural purposes. The number of horses and oxen used for stage, team, carriage, and pleasure purposes, and also those employed at factories, quarries, &c., is very considerable; but, not being contemplated in your queries, we omit them.)

Increase of value on 2,400 beef cattle fattened—average weight, 750 lbs., at $3 per cwt.—$22 50........		$54,000
Increase of value on 1,800 head of young stock, at $10 per head....................................		18,000
Product of 1,700 head of milch dairy cows, at $70.....		119,900
Product of 8,500 head of butter dairy cows, as follows:		
*125 lbs. butter per head—1,062,500 lbs., at 25 cents..............................	$265,625	
8,500 calves, five weeks old, at $5......	42,500	
680,000 lbs. small pork—80 lbs. per cow; being gain in weight fed on sour milk, at $7..................................	47,600	
Materials for iced cream................	50,000	
		405,725
Equal to $47 73 per head.		
6,000 hogs, exclusive of those fed at dairies—average weight, 250 lbs.—1,500,000 lbs., at 5 cents..........		75,000
Increase on 25,000 sheep fattened on grass, at 75 cents per head.......................................		18,750
Poultry, 80,000 hens; 6 dozen eggs and 3 chickens each —eggs 15 cents per dozen; chickens 25 cents each (18 hens to each family)............................		132,000
Turkies, geese, ducks, game fowls, and pigeons........		12,300
Produce of bees (estimated uncertainly).............		1,350
		836,125

A few remarks in detail on the several items embraced in the foregoing, may be necessary to your purpose; although this communication has already exceeded a suitable limit.

Wheat.—All the varieties of our soil are more or less friendly to wheat, and, in ordinary seasons, will produce a greater or less quantity; not strictly in proportion to the natural fertility of the soil, but to the quantity and strength of the manure *applied at the time of seeding.* Clay soil generally produces the heaviest growth of straw, and in dry seasons, of grain also; but, being more liable to injury from excess of moisture, and by mildew, it is scarcely

* In our usual seasons, it is believed the quantity would average 140 pounds.

preferable. Several varieties have been cultivated in succession within a few years—the "red chaff, bearded," "Mediterranean," and "mountain," or "Stewart wheat." The character of the two former is well known; and, though formerly in high repute. will probably yield to the present high opinion entertained for the latter. The "mountain" is a beautiful variety, nearly beardless, and has been extensively cultivated the last year, yielding a product of 30, 40, and, in a few instances, 45 bushels per acre; more than doubling the usual acreable product of any hitherto known variety. In the cultivation of all the varieties with us the treatment is the same, viz: 25 to 30 ox-cart loads per acre of good manure is spread on oat stbble in August, early, and ploughed under at once. From the 15th of September to the 1st of October, the ground is re-ploughed and sowed broadcast, or drilled. In some instances the grain is covered with the plough—deemed preferable in flat, heavy grounds; in other cases, harrowed in after the plough. In all cases the ground is sowed *immediately* with four or more quarts of Timothy seed per acre. The quantity of seed wheat per acre, when sown broadcast, is from seven to eight pecks per acre. When drilled, six pecks. The early sowed wheat has recently proved most successful, though attacked by the fly in the fall. The increased strength acquired has enabled the plant to overcome the effect to a great extent; while the late sowed continues feeble through the winter, escaping the fly for the time, but uniformly attacked and seriously injured on the following spring. No spring wheat is cultivated with us. Usual time of harvest, from the 4th to the 15th of July. The present year, from 26th of June to July 10th. Early sowed crops very fine, late, very light; the whole estimated to produce 20 bushels per acre; being an increase of 20 per cent. over the crop of 1847.

The cost of wheat per bushel to the producer cannot be arrived at with precision, where its cultivation is merely a link in a chain of operations, and it is by no means the most important one. The actual labor and expense incurred during the time of its cultivation and growth, harvesting, &c., is as follows:

Interest on $85—value of one acre of land	$5 10
Hauling and spreading 25 loads manure	3 00
Twice ploughing	3 00
Harrowing and marking	1 50
Sowing	25
Threshing and cleaning, at 12½ cents per bushel	2 50
Harvesting the same	2 50
¼ value of 25 loads of manure	6 15
Hauling to the mill, 20 bushels, at 4 cents	80
2 bushels of seed	2 50
	27 40
Deduct 1 ton of straw per acre	7 00
Whole cost, at $1 02 per bushel	20 40

Ten per cent. damage by the "fly" is believed to be a fair estimate. It is estimated that the whole wheat crop of the county is consumed within its limits, in the form of bread, &c., and in our manufactories, for sizing, and other purposes.

Oats is one of our standard crops, cultivated extensively, and reluctantly, as one intervening between the corn and wheat crops. It is considered very exhausting to the soil, and if corn could be cleared from the field sufficiently early to admit the necessary preparation for wheat in good time, would be abandoned. A black variety is in general favor at present. The expense and labor attending its cultivation is comparatively small. Corn ground of the preceding year is once ploughed, 3 bushels of seed spread upon it to the acre, and twice harrowed, in the month of March or April, indifferently; (early sowing generally yielding the heaviest grain;) the crop harvested in July, and threshed at leisure; yielding this year a full average crop, estimated at 35 bushels per acre; being an increase over that of 1847 of 75 per cent. Cost of production, after deducting $7 per acre for value of straw, 21 cents per bushel. Consumed in the county as food for horses, cows, and hogs. Present value, 35 cents per bushel. Manure is never applied to this crop. Moderately fertile land of any of our varieties of soil, is most suitable to this grain to insure a heavy yield.

Rye, formerly cultivated here when growing grain was the leading business of the farmer, has been almost abandoned within the last 20 years. A blight attacked it some 12 or 15 years since, and reduced the product to about the quantity of seed. A few patches the present year appeared clear of disease, and produced a tolerable crop. We venture to estimate the quantity cultivated at 600 acres, and the product 15 bushels per acre, worth at Philadelphia 65 cents per bushel. Thin and serpentine land was formerly esteemed more profitably employed in the growth of rye than other crops. The increased attention to accumulating manure has changed this condition, and it is probable that rye will soon disappear from the list of our cultivated crops.

Indian corn is decidedly our most important grain crop. Pasture ground of 4 or more years standing, (the longer the better,) is ploughed during the autumn, winter, or spring, at convenience, well harrowed, and laid off by furrows 4 or 4½ feet apart each way, and planted at the intersections about the last of April or beginning of May, as the season may admit. After the plant is above ground fairly, the number is reduced to 3, or at most 4, in each hill, and the "cultivator" is passed twice each way between the rows, and again each way at intervals until the ear shoots; all suckers in the mean time are pruned out. When the husk is ripe and grain *nearly* hard, the whole crop is cut off near the ground, and shocked 48 hills together, around 4 hills left standing for the purpose, secured by a band from falling, and left in that condition until October, when it is husked in the field, and cribbed in an open lath-work building, of any length and height, but not more than 3 or 4 feet wide, to admit the air freely through the ears. *The stalks, with* the husks remaining upon them, are bound in convenient sized bundles and shocked or stacked where they are

wanted for use. On thin ground a shovel full of manure from the hog pen, or other rich earth, is frequently put in the hills previously to planting; and on all grounds plaster is either placed on the hill or sown broadcast over the field—the latter is preferable. In a greater degree than any other grain crop success with corn depends on the natural fertility of the soil, the length of time the ground has remained in sod, and continual stirring the surface. The "cut worm" has been very destructive several years past until the present; and the "heart worm" is a great enemy to the plant in its early stages, particularly in clay soil. A loss of 10 per cent may be safely charged annually to the destruction committed by these two insects. Several varieties of Indian corn are cultivated here, more or less approaching the "gourd seed" character—a tendency observed in all varieties after a few years' domestication; none of *it* in its purity is in use. Yellow flint, of from 12 to 24 rows, more or less, pitted grain, is the character all varieties assume eventually. Soil inclining to sandy, perfectly dry, is most genial to this crop, and in ordinary seasons produce the heaviest yield. Early planting generally succeeds best, by escaping the effects of our usual droughts of August, at a critical period of its growth. Fall or winter ploughing is found to be the only defence against the "cut worm." Average yield the present year 45 bushels per acre—equal to the crop of 1847; present value 60 cents per bushel; cost of production is estimated as follows, viz:

Interest on 1 acre of ground	$5 10
Ploughing same	2 00
Harrowing and marking	1 00
Seed	10
Planting	50
Cultivation after	3 00
Cutting the crop and shocking	1 50
Husking and hauling	2 00
Delivery at the mills	1 00
45 bushels per acre, at 36 cents per bushel, cost	16 20

or 20½ cents per bushel, when $7 is allowed for corn fodder.

Nearly the entire crop is consumed in the county as food for beef cattle, hogs, dairy cows, horses, and for human food in small quantity.

Potatoes.—Moderately fertile soil, slightly elevated and inclining to sandy, well manured, is esteemed most suitable to this crop. In portions of this county adjacent to Philadelphia, potatoes are cultivated extensively for sale in that city, in other localities for domestic consumption. On a corner of a field appropriated to corn or oats, from 25 to 40 ox cart loads of manure from the barn yard is spread per acre, from the 20th of March to the middle of May, and ploughed under immediately; potatoes divided into 4 or 6 pieces are dropped at the distance of 8 to 12 inches apart in every third furrow; when the plants are fairly above ground the surface is thoroughly broken by the harrow, without regard to the plant; the cultivator is occasionally passed between the rows until

the tops fall; on level ground the operation is ended by throwing a light furrow to the rows, and it is left without further attention, except to eradicate weeds, until the crop is ripe in August or September. To escape the disease, the crop was generally gathered this year much earlier than usual; and though fears were entertained that the warm weather might be injurious to the potatoes after taken from the earth, they have been well kept in the usual way without loss. Several varieties are cultivated, but the "Mercers" constitute nine-tenths of the whole A new variety, called "Elwyn," has been recently introduced, but their character has not yet become established. No marked distinction in liability to disease has been observed the present year in the different varieties; a trace of it was very general in all. Our present loss from that cause is esteemed an ample allowance; their exemption is attributed to their being taken from the ground early—principally in August, while the drought continued. This latter cause contributed to diminish the crop sensibly on dry southern exposures; altogether, however, the yield was fair—estimated at 100 bushels per acre—exceeding that of 1847, 75 per cent. The crop of 1847 suffered by the disease, probably caused by the great amount of wet weather in the fall.

Cost of production, viz:

Interest on land per acre	\$5 10
Hauling and spreading manure	4 00
Ploughing and planting	3 00
Seed	6 00
Cultivation	3 00
Gathering	5 00
$\frac{1}{4}$ value of 30 loads of manure	7 50
Delivering at sale	3 00
Equal to $36\frac{1}{2}$ cents per bushel	36 60

The crop of potatoes is generally consumed in the county as human food, the balance sold daily in Philadelphia market.

Hay, straw, and corn-fodder.—The chief dependance for hay is on the cultivated grasses (timothy and clover mixed) cut from ground recently cultivated with grain crops, and natural grass from meadows, artificially watered by ditches, or overflowed by natural streams; from the former one crop is taken annually; from the latter, two. Estimated to have produced the present year $1\frac{1}{2}$ tons per acre round, and to be 30 per cent. greater than the crop of 1847—(injured by the drought in May and June of that year.) The crop of this year was a heavy one, and well secured; present price \$10 to \$12 per ton; it is principally consumed in the county, the balance generally sold in Philadelphia at from \$12 to \$20 per ton. Straw and corn-fodder are chief amongst the valuable auxiliaries of the farmer in passing his stock over the long foddering seasons. Though not generally given exclusively to any description of cat-

tle, they form a valuable alternation with hay for all. Corn-fodder is much relished by all horned cattle, and steers in some instances have been confined to it exclusively, and improved satisfactorily. The quantity of all descriptions of straw and corn-fodder, collectively, is estimated at 1 ton per acre, cultivated with wheat, rye, oats, and corn—equal to 24,400 tons, worth for fodder $5 per ton, and for manure $2=$7 per ton.

Pasture, though not named in your circular, is a product of the soil of such vast importance in every view, that a few remarks on that head would not be out of place here. Our pasture grounds vary widely in productiveness, from difference in soil, situation, seasons, and interval since cultivation. Rich soils, recently cultivated, yield largely in bulk, but pastures of longer standing, if top-dressed with almost any of the usual manures, will produce a larger aggregate amount of food, annually, of a greatly superior quality, either for grazing beef or dairy stock, were it not for the injury from our usual droughts, to which it is very susceptible, the cultivation of grain crops, now resorted to mainly to obviate this difficulty, would be in a great degree abandoned. Something less than two acres per head of our average pastures are necessary to the profitable support of our mixed stocks, commencing about the 1st or 10th of May and continuing until the middle of November or later. The drought of the present year commenced in July and continued until late in September, with such intensity as almost to destroy vegetable life, and though a fine growing season succeeded, the pasture was consumed as it appeared, furnishing at no time since July a full sufficiency, and ceased altogether as soon as it ceased to grow.

We estimate the value of pasture per head, to our 10,200 dairy cows, to be 80 cents per week each, for 26 weeks	$212,160
Ditto for 6,000 beef and working cattle, at 50 cts. " "	78,000
Ditto for 1,800 young stock, at 25 cents........" "	11,700
Ditto for 25,000 sheep transiently grazed after harvest, at 75 cents per head....................................	18,750
33,984 acres, estimated worth $9 43 per acre...........	320,610

"Uncultivated land" comprises about 20 per cent. of our territory, consisting of native forest yet under the process of being "cleared," roads, streams, &c. Until recently, the owners of wood land have been reluctant to diminish the quantity; but the present more profitable appropriation of our cleared land, in connexion with the cheapened price of fuel since the introduction of coal, has induced a change, and a rapid encroachment on its former limits is observable. It is estimated that the annual increase of timber does not exceed one cord per acre, nor its value $3, as it stands in the woods.

Root crops.—Turnips, beets, and sweet potatoes, for family use, constitute the bulk of our root crops. Sugar beets were cultivated in considerable quantities some ten years since, and succeeded

well. On a few perches, in 1839, the writer raised a very heavy crop, exceeding the rate of 1,000 bushels per acre, intended for beef cattle; but observing that hogs eat them freely, the whole were fed to eight confined in a pen during three months of severe winter weather, excluding all other food. They throve vigorously, drank but little, and wore a smooth healthy coat of hair never witnessed under other treatment. The quantity given was three bushels per day to eight hogs of some 120 pounds weight each, gradually increasing the quantity to four bushels daily. Their cultivation has greatly decreased, the principal obstacle being the inconvenience of diverting the necessary attention from the regular routine of the farm, under the scarcity of labor always experienced. Turnips and sweet potatoes are seldom cultivated beyond the necessary quantity for family use. We venture to estimate the quantity of land appropriated to all at 600 acres. Value of produce $50 per acre. No increase over 1847.

Small fruit.—The cultivation of raspberries, strawberries, grapes, cherries, plums, &c., for domestic consumption, and for sale in Philadelphia market, is increasing, and already constitute important items in the catalogue of our *exports*, bidding fair to rival at no distant day other now far more considerable interests. With but slender data, other than personal observation, we estimate the quantity of ground so appropriated at 300 acres, and the value of produce at $150 per acre. Increase 20 per cent. over 1847. Other hands than those of agricultural laborers are competent to their cultivation, and an indefinite increase is probable. Much attention is recently bestowed on the cultivation of grapes for table use. The Isabella and Catawba are the favorites. No foreign variety is found to succeed so well, and are generally neglected.

Orchards.—The increasing value of land for other purposes, and the recent disuse of cider as a beverage, has diminished the credit of apple orchards; and the progress of decline has been quite perceptible the last few years. As a marketable article, however, much attention has recently been given to the production of varieties suitable for table use. The cultivation of peaches and pears is also increasing. The former, ten years since confined to the garden, and a small corner of our county besides, has since expanded to a large interest in every district. Of peaches, the crops of 1847 and the present, were very heavy, perhaps about equal. Apples in 1847 was a total failure, (from a small lead colored insect infesting the bark and leaves, answering the description of your correspondent from Long Island in last year's report;) the present a very large crop—quality fine. An increase of 15 per cent. may be estimated for the quantity of land appropriated to orchards of all kinds the present year. The whole at present, at 4,500 acres, and the produce in value at $120,000.

"*New products.*"—Broom corn is cultivated to some extent in this county for domestic use, in quantities from a few perches to a few acres. The whole quantity cannot be accurately determined; but may amount to 200 or 300 acres. The crop is esteemed equally

profitable with corn, and is believed to be increasing. The "brush" is manufactured into brooms on the spot, and sold in the neighborhood—probably equalling the demand.

Dairying is decidedly the leading business of our agriculturists, as the direct and indirect means of converting a large portion of the produce into cash. It has been mainly instrumental in changing the worn out and impoverished aspect of our farms some 25 years since, to their present cheering and profitable state of productiveness. Our dairy stock consists largely of our native breeds of cows, preferred for their profitable dairy qualities to any pure blood or cross of imported stock. After considerable experience, a small number are annually raised on our farms; but the chief dependence for our continual supply is on those raised and annually driven from districts west and northward of us in this State. The estimate of the quantity and value of dairy produce is given in another place. It is believed that an annual increase of 10 per cent. in the number of cows, and much greater in products, has occurred within the last 25 years, as a consequence of diminishing the wood land; increasing capacity of our soil in productive qualities, and in displacing beef cattle; greater attention to and increased demand for dairy products, with skill acquired by experience in the general management, and the diversion of a considerable portion to supply the recent increasing demand for ice cream. In 1847, a backward spring and severe drought in May and June, materially diminished the product below the average. In 1848, a drought of greater intensity, commencing in July, and continuing until September, almost annihilated the pastures, and affected the quantity to even greater extent. The enhanced price, however, from the scarcity produced, amounted to a full equivalent. The high estimation of "good springs," as the cause of the excellent quality of our butter, has recently become shaken by the result of experience. A properly regulated temperature in well aired milk-houses without water, *above* that of the spring-house in winter, spring, and fall, and *below* it in hot summer weather, has been found to produce the greatest quantity of butter of a quality fully equal; and the cause of alleged superiority, if such exists, may probably be attributed to some peculiarity in the soil, grasses, and water, upon which the cattle subsist. An abundance of pasture during the summer, liberal winter feeding on an ample quantity of good hay and corn fodder, and, after calving, an addition of corn and oats meal mixed, or wheat bran, in any form, comfortable shelter, free access to water, with perfect cleanliness throughout, are the usual and necessary conditions of a profitable dairy stock. Cheese has long since ceased as a product of our dairies.

The difficulty of procuring the necessary assistance in conducting our dairies has, in some instances, led to a change from the usual mode. A family properly constituted is furnished with a dwelling-house, garden, &c., gratis—who milk, churn, and prepare the butter for market—with all necessary business at the spring-house. The usual price for all these services is $3\frac{1}{2}$ to 4 cents per

pound for all the butter made, in addition to dwelling-house, &c. This method is convenient for all concerned, and is increasing.

The cost of conducting a dairy of 20 cows is as follows, viz:

House rent for family	$25 00
Making 2,500 lbs. of butter at four cents (estimated 125 lbs. per cow)	100 00
Marketing the same at two cents per pound	50 00
Six months' care of stock in winter (one hand at $5 per month and board)	60 00
Interest on cost of 20 cows at $30 each	36 00
Annual declension in value of each cow at $3	60 00
Cost per head, $16 55	$331 00
Estimate product, $47 73 each	954 60
Leaving $31 18 per head to pay for hay, grain and pasture	$623 60

Raising stock.—This branch of business has greatly declined within a few years, and is confined at present to a few calves from superior cows in the dairies, and to a still less number of horses by farmers for their own use. Interesting specimens of both appear at our exhibitions annually, but as a business it no longer exists, owing to the more profitable application of provisions and attention to the dairy.

Sheep, as permanent stock, has, for the same reason, disappeared from our farms. Some 25,000 heads are annually driven into our county from the western sections of our State, fatted on our usual spare pasture after harvest, and sold principally for the Philadelphia market. The average advance received upon them may be 75 cents per head.

Hogs form an important appendage to every dairy establishment for the consumption of sour milk and other refuse. They are generally taken to the pens at four or five weeks old, at a cost from $1 to $1 50 each, in the spring, and butchered for the Philadelphia market late in the summer and fall, commanding seven to nine cents per pound; 80 lbs. of pork is counted upon as the net produce of each cow in the dairy. Exclusive of these there are raised and fatted annually on the farms, and by other householders, a number estimated at 6,000; weighing, when slaughtered, at nine to fifteen months old, an average of 250 lbs.; worth at an *early* market in 1847, $7 per hundred pounds, and the present year $6. After supplying the local demand the surplus is sold to sausage-makers for Philadelphia consumption. The application of our agricultural produce to more profitable purposes will probably prevent any increase in this description of hogs. The Berkshire breed, introduced some fifteen years since with such favorable anticipations, has been repudiated. A cross, however, of that, with our mixed

breeds previously used, has resulted in a stock far more valuable for the dairy than either, and much attention is given to improve it.

Poultry.—The continual opportunities afforded by dairymen for a market at Philadelphia, for their own produce, and that of their neighbors, induces considerable attention to poultry by our inhabitants generally. The number of hens kept permanently in the county is estimated at 80,000, or 18 to each family; worth 25 cents each, producing an average of 72 eggs and three chickens annually, the former worth 15 cents per dozen, the latter 25 cents each, in the Philadelphia market; worth altogether $132,000. Turkeys, geese and ducks, together, $12,300; total $144,300. This estimate is considered rather too low.

Bees are gradually and permanently decreasing in the county. The improved methods of treatment have very generally been applied by those who continue to give attention to them with decided success against the common enemy. We have very slender data for the estimate given in another place, but believe it to be sufficiently low.

Manure.—Stable manure, lime, street dirt, guano, bone dust and plaster are the principal fertilizing agents in common use. Large deposites of primitive limestone, of excellent quality for the purpose, exist in the great valley of Chester county, at a distance of 12 miles from the centre of our county. From this source our land has been treated, within 30 years, with from 40 to 100 bushels per acre; a large portion of it repeatedly with great present and permanent advantage. Every variety of our soil (primitive formation destitute of lime) is found to be greatly benefitted by it; and the process is still going forward with spirit. The average cost per bushel to all parts of the county is about 15 cents. Our methods of application vary but little; spreading it on the grass sod one or more years before breaking it up for corn, is generally practised merely as being convenient. But in any form, season, or quantity, its benefits are satisfactorily realized. The chief dependence, however, is on the stable manure, produced in wintering our comparatively large stocks. Every convenient means is resorted to to increase the quantity by the accumulation of vegetable matter in the stable yards, hogpens, &c. In some instances the yards and stables are covered to the depth of 10 or 12 inches with earth from hedges, ditches, &c., which, after remaining during the winter, absorbing the urine and other valuable liquids usually suffered to escape, is mixed and heaped with the unfermented manure on the following spring; the whole left until wanted for the wheat crop, or for top-dressing grass grounds, when it is spread on the field in the usual quantity of 25 ox-cart loads per acre. Ten years' practice of this method enables the writer to say, confidently, that the quantity of manure usually made at our farm yards may be thus doubled, and the quality entirely equal. The only extra cost is the hauling, which may be compensated by the destruction of trash of all kinds liable to accumulate in such places, and in the improved neatness of his farm. Street dirt is obtained from Philadelphia for use in the vicinity of tide-water, and is deemed the most economical out-

lay for manure when practicable. Bone dust has been applied to some extent with satisfactory results. Guano has also been extensively experimented upon; its immediate effects are highly satisfactory on every crop, but the benefit compared with the present high price of the article will probably preclude its general use by farmers under our present system. Plaster is in high repute, and extensively used in this county, particularly on soils inclining to sandy. Its benefits are less marked on heavy clay soils. Indian corn, clover, and, indeed, all grasses, give immediate evidence of its genial properties when assisted by the necessary quantity of rain to dissolve it. One bushel per acre sown broadcast is the usual mode of application. Its effects continue nearly unabated for three or more years. And it is remarked that clover and old pastures vegetate earlier in the spring and later in the fall, when treated with plaster, than otherwise. The formation of composts, so prevalent twenty years since, has been nearly discontinued—no adequate return for the extra labor being realized beyond that from a direct application of the materials to the soil.

Probable consumption of wheat, beef, &c.—Our county contains about 130 manufactories of various kinds, furnishing employment to a large portion of our population, whose liberal earnings enable them to procure all the necessaries of life without stint, affording to the adjoining agricultural districts a convenient and profitable market for fruit, potatoes, vegetables, firewood, meat, flour, &c. Very little Indian corn or rye is consumed as human food; butchers' meat, wheat bread, potatoes and other vegetables constitute the chief consumed by them. The same by the agricultural class, except that the animal food used is mainly salted beef and pork of their own production. Under these circumstances, with the assistance of personal observation, we deem it safe to estimate the consumption of each individual of our population above 10 years of age, says 15,000, as follows:

180 lbs. of annual food at six cents	$10 80	
8 bushels wheat at $1 15	9 20	
2 do corn and buckwheat at 70 cents	1 40	
3 do potatoes at 50 cents	1 50	
Other vegetables and fruit	5 00	
20 lbs. butter at 25 cents	5 00	
Eggs, fowls, &c	2 00	
Firewood	2 00	
	$36 90	
$31 29 each, equal to $682,650.		$31 29
7,000 children under ten years of age, one half	18 45	

The average annual consumption of agricultural produce by our present assumed population of 22,000 souls, is estimated in value at $31 29 per head, as above; and in aggregate quantity and value, as follows, viz:

Animal flesh—3,330,000 lbs. at 6 cts.	$199,800
Butter—370,000 lbs. at 25 cts.	92,500
New milk, omitted in the foregoing estimate...	19,000
Poultry and eggs	37,000
Vegetables of all kinds, and fruit	92,500
Firewood—9,250 cords, at $4	37,000
Wheat—148,000 bushels, at $1 15	170,200
Corn and buckwheat—37,000 bushels, at 70 cts.	25,900
Potatoes—55,500 bushels, at 50 cts	27,750
	$701,650

$31 89 per head—excess of $19,000 for milk.

The remainder is disposed of as follows, viz:

Wheat—surplus used for seed.	
Oats—consumed by farm stock, 129,000 bushels; surplus, 109,000 bushels, at 35 cts	$38,100
Rye—consumed by farm stock, 5,000 bushels; surplus, 4,000 bushels, at 65 cts	2,600
Corn—consumed by farm stock, 234,000 bushels; surplus, 141,000 bushels, at 60 cts.	84,000
Potatoes—surplus, 78,500 bushels, at 50 cts..	39,250
Hay—consumed by farm stock, 36,000 tons; surplus, 2,250 tons, at $15	33,750
Small fruit—surplus	30,000
Straw and fodder—consumed by farm stock, 22,400 tons; surplus, 2,000 tons, at $7	14,000
Root crops and orchard produce, garden truck, &c.—surplus	133,000
Milk of all kinds—consumed by farm stock, $47,600; surplus	100,000
Iced cream—surplus	50,000
Butter—surplus, 692,500 lbs. at 25 cts	173,125
Meat of all kinds—surplus, 3,360,000 lbs. at 6 cts	201,600
Poultry and eggs—surplus	107,000
Value of estimated surplus	$1,007,025

Articles of produce not named above, are generally consumed in the county.

A large proportion of the surplus—corn, oats, hay and straw—find ready sale at our manufactories, mills and villages, for other purposes than agricultural stock. The balance is sold at Philadelphia, together with all others enumerated above, conveyed partly by railroad and water conveyance, but principally in private vehicles by land. Average cost of conveyance and sales is about 8 per cent. on the gross amount.

Wages of labor.—Agricultural labor commands from $8 to $12 per month by the year, with board; transient labor, 50 cents per day; harvesting, $1; female domestics, from $1 to $1 50 per week;

mechanics, from $12 to $20 per month and board, depending on the business.

Our county contains about fifty cotton and woollen manufactories. It was our purpose, originally, to have given a condensed view of their operations, capacity, &c., although such information was not included in your circular, but the extreme length this communication has already attained forbids it. To give a faint idea, however, of their importance to our local community, we subjoin the reply of one so engaged, to our circular. It is selected as being about a fair average of the whole number in scale of operations and numbers employed:

PENNSGROVE, *November* 14, 1848.

GENTLEMEN: Agreeably to your request, I herewith annex answers to the queries propounded to me, and which, I trust, will be found satisfactory.

There is annually consumed at Penngrove factory—

983 bales of cotton, 404,588 lbs., varying from 7 to 9 cts. per lb.
100 tons of coal, at from $3 55 to $3 90 per ton.
800 gallons sperm oil, at $1 10 per gallon.
500 " lunar oil, at 55 cents.
162 bbls. flour, at $5.
3 tons of iron, and about 20 cords of firewood.
1,400 lbs.; leather, (various kinds,) at 25 cts. per lb.

I have in operation 161 looms, with spinning sufficient to keep them supplied with warps and filling. The looms produce about 40 yards of cloth per day each.

The wages paid average $2,100 per month of four weeks. The hauling amounts to $1,200 annually. The population connected with the place numbers 350 souls; of which number 56 men, 15 women, 80 boys and girls, are workers.

Very respectfully, yours, &c.,

SAMUEL RIDDLE.

To JOSEPH EDWARDS and M. PAINTER, Esqs.,
Lima, Delaware county, Pennsylvania.

The foregoing is respectfully submitted, with the hope that some benefits may result to the great agricultural interests of the country from the labors which at present engage your attention.

Respectfully yours, &c.,

JOSEPH EDWARDS,
MINSHALL PAINTER.

Hon. EDMUND BURKE,
Commissioner of Patents, Washington.

BETHANY, WAYNE COUNTY, PENNSYLVANIA, 1848.

DEAR SIR: For your favor of the last report of the Commissioner of Patents, you will please accept my hearty thanks.

Your circular of inquiries for 1848, I had the honor to receive. I have proposed to several gentlemen, more at leisure, and better able to answer the interrogatories than myself, to take it and furnish the answers. After an unjustifiable delay, I hasten to reply, in my way, to such interrogatories as seem properly to belong to this section of the country.

Wheat culture.—Ours is a hilly district of country, rich in soil, but not naturally adapted to the growing of wheat; scientific farming may be said to be in its infancy with us. Many of our best farmers are now occupying the same lands on which they commenced with the axe, having succeeded, after years of toil, in subduing and bringing back the forest, year by year, until, at last, they have opened to the sun a sufficient quantity of land to induce the belief that it will do to quit farm making and commence the more agreeable business of farming.

Growing of wheat on the new land fallow, rich with the decomposition of an annual crop of foliage, a thousand times repeated, quickened in its action upon the few first crops, by the alkali consequent upon the burning of a heavy growth of timber on the land, was not sure to return a remunerating crop; we were sure of a luxuriant growth of straw, which too frequently fell, or lodged, and spoiled the berry. Rye was more generally sown on new land, and great crops almost invariably harvested. Our fields, after having been in grass a few years, and properly summer fallowed, are tolerably sure of a crop of wheat. But the growing of winter wheat is too uncertain to receive much attention, as with a majority of the once good wheat fields in the counties of Duchess and Orange, in the State of New York; we do, however, get good crops of it. The premium crop in our county was this year about twenty-six bushels to the acre, by weight. Spring wheat is with us evidently the safest and most reliable crop. Different varieties of it are cultivated with good success. Siberian and Italian are most approved. Black sea has been introduced recently, but has not succeeded as well. Spring wheat is commonly sown about the 1st of April, 1¼ bushels to the acre; some prefer 1 bushel. Harvested first week in August; average yield sixteen to eighteen bushels per acre. Average crop winter wheat about the same; worth $1 25 to $1 50 per bushel. Red slate, or what is commonly called red shale, is best wheat land. Wheat crop this year double that of '47; more sown; demand is always good; markets handy.

Barley.—But little attention is paid to raising it; have known large yields of it in this neighborhood; 40 to 50 bushels per acre.; average about 30, worth 80 cents per bushel; two-rowed surest; stands up best, yields best. Oats are grown abundantly. The temperature of the weather during the spring and early part of the summer, the natural moisture and frequent showers with which we are commonly favored, tends to promote the growth.

The crop of this season full one-quarter better than that of '47.

The land generally better prepared, and sown in better season—the last of April, or the first of May. A man desiring to raise light oats would sow in June. Yield per acre depends mainly on the condition of the land, season of sowing, quantity and quality of seed. Two or three bushels generally sown to the acre. Some of our farmers prefer sowing 90 to 100 pounds to the acre. From seeding to harvest, 12 to 13 weeks. Average crop per acre, 35 bushels—I have known 90. Fifty-five to sixty is a good crop. Driving farmers I have known to sow the same field four, six, and even eight years in succession, with tolerable success, by turning in the stubble immediately after harvest, and crossing it in the spring. Average price 40 cents per bushel.

Rye is better this season than in '47—near 50 per cent. It is, as usual, well filled and plump. In '47, it was, from some cause, light and poor. Generally sown in September. Average yield about 14 bushels per acre. Harvested in the early part of July; worth 87½ cents to $1 per bushel.

Buckwheat is an article considerably used in this section; grows luxuriantly. The crop this season was good; perhaps never secured in better order. One-third more raised than in '47. It is generally sown in the last week in June, or first in July, about three pecks to the acre. Harvested first of September. Average yield, 35 bushels per acre; worth 50 cents per bushels. Buckwheat cakes, manufactured and cooked in the style of the day, served up with butter and honey, are regarded a lawful tender in northeastern Pennsylvania.

Indian corn.—There have been many excellent crops in this county this season; but the average is below an ordinary crop, compared with the crop of '47; I think less 25 per cent. The weather at the proper seed time was fine; but, before the corn came up, a cold rain storm commenced, and continued so, with little exception, three weeks, endangering the germinating of the seed. In many instances it came up badly; continued feeble and sickly into July. The middle and latter part of summer has been too dry. Commonly plant about the 15th of May; harvest, 10th of October. Average yield per acre, 30 to 35 bushels. Yellow flint is the most approved kind. It grows best on sand and slate shale soil. Worth six to eight shillings per bushel. Premium crop this season, 99 bushels shelled corn per acre.

Potatoes.—Different varieties have done much better than in '47—I think 70 per cent.—but little complaint from the rot. It is believed that planting sufficiently early to have them reach maturity before the ordinary season of rot arrives, has nearly worked a cure of that loathsome malady. Small tubers have, in many instances, been selected for seed. We formerly planted for winter use, as best suited our convenience, from 10th of May to 25th of June. This season, most of the crops were planted in April, some in March. Different notions are entertained respecting the seeding. Seven to ten bushels of full-grown tubers are planted to the acre in this school district. Some good farmers prefer seven to ten bushels to the acre; and this they plant on the surface, cover shallow, and, at hoeing time, hill slightly—use lime and plaster.

Average yield per acre, 250 bushels. Long red kind grow best, and yield best. Worth 50 cents a bushel generally. Mercers the best for table use, and sell best.

Hay.—No better hay can be found than is made in this county. Have an average crop this year of an excellent quality—clover and timothy on the upland; timothy and red-top on the low lands. Average crop two to three tons per acre on newly stocked meadows. Many farmers in this county secured their entire crop this season without one drop of *rain* or *rum*—generally secured between the 10th of July and the 15th of August. Worth $8 to $10 per ton, occasionally much higher.

Hemp, flax, silk, and tobacco.—But little attention is paid to the cultivation of these articles. Sugar from the maple tree is made in abundance, and that, too, of superior quality. With suitable care in the manufacture, it is equal to the best that can be made from the sugar cane. Worth eight cents per pound.

Cornstalks and straw are of less value in comparison to grain here, than in other sections of the country, where hay is less abundant. I think them equal to about one-third their weight in hay.

Probable proportion of cultivated and uncultivated lands.—It is entirely out of my power to answer this question definitely. Different individuals, of whom I have made inquiry, differ widely from each other on the subject. The land in our county, with very little exception, is susceptible of cultivation. Our valleys are fertile, and abound with excellent water power. Our hill-slopes are arable to the top, and seldom broken with ledges. Many tracts of timber lands are, on account of timber, regarded more valuable than cultivated fields. Economy is constantly crying, "spare that tree." Great improvements have been made in this county since 1840. It is rapidly filling up with an enterprising and industrious population. Thriving and beautiful villages are to be seen along the line of the railroad and canal of the Delaware and Hudson Canal Company, and along the improvements of the Washington Coal Company. In these villages, rendered brisk and lively by mercantile and manufacturing operations, the farmer finds ready cash markets for all his produce, generally a little above the New York prices. The improvements of the Delaware and Hudson Company have been of immense profit to the farmers in this county. The great New York and Erie railroad, just now going into operation, skirts our county on the east and north. Other projected improvements, waiting only legislative sanction, will, in a short time, perforate this county, and assist in making it what nature designed it to be, one of the richest counties of the commonwealth.

Most approved rotation of crops.—Until within a few years, there has been but little attention paid to regular rotation of crops; and even now, there is is not a uniformity of practice on the subject. Good farmers, differently circumstanced, or occupying different soils, may be expected to pursue different methods for bringing out the capabilities of the soil, as well as for the sustaining of their families. In our immediate neighborhood, we prefer turning in

sward in the spring, planting with corn, follow with wheat, then one or two crops of oats, before stocking with timothy and clover. Some prosperous farmers of my acquaintance practise manuring, and running the same field eight, ten, and even fifteen years, with alternate crops of corn and wheat.

Root crops.—Rutabaga, and yellow and white turnip are cultivated somewhat extensively for feeding cattle, horses, and sheep. Swine are frequently wintered on ruta-baga. It is argeed that ruta-baga for feeding working oxen, in winter, is preferable to grain. 300 bushels to the acre is an average crop. 1,200 to 1,300 are sometimes raised, worth about 31 cents per bushel. Sugar beets and carrots less extensively raised. They do not yield so much per acre; worth about the same as turnips.

Pod fruits.—Peas grow luxuriantly, yielding 25 to 30 bushels per acre; worth $1 per bushel; are not exhausting to the soil. I think the pea crop should be regarded as a fertilizer.

Orchards.—Many of the apple orchards are youthful, and in an excellent bearing condition. But few apples have as yet been exported. Choice varieties for domestic use are now worth 50 cents per bushel. Fruit trees in general are receiving increased attention. Cider apples are worth, delivered at the mill, 12½ cents per bushel. The growing of superior apples is now a source of wealth to the husbandman. I know of one apple tree in this county that s but 31 years from the seed, not grafted, that has been three times transplanted since 1820, now on a lot of 50 acres good improved land, that has for the last ten years yielded fruit sufficient to pay the entire taxes on the said farm. This season it yielded but ten bushels, most of which have been marketed at $1 50 per barrel.

Small fruit.—Currants and cherries flourish remarkably. Strawberries and grapes are cultivated with tolerable success. Our winters are too severe for the spontaneous growth of choice grapes, and strawberries do not grow as large and abundantly in our meadows and fields as in sections of country less natural to grass.

Dairy butter and cheese.—A handsome increase upon '45; near one-third, perhaps quite. Our stock of cows has improved in quality; more are kept, and more attention is paid to the different departments of the business. The demand this season has been good—better than usual. Butter is now worth 18 to 22 cents per pound at home. Cheese is worth 8 to 10 cents per pound.

Raising stock.—A commendable zeal for improvement has kindled among the farmers of late. Our native shrub-oak cattle, dwarfish, rough, and frightful, are fast giving place to the fine, beautiful and quiet Devonshires. There was present at our agricultural fair in October last, gratifying evidence of improvement in our neat stock; indicating what may be done in the improvement of stock in a short time, by a few ambitious, enterprising farmers. Calves of the Devonshire and Durham stock are, at four weeks old, worth more than those of the native stock at five; if kept for the dairy or the yoke, are more profitable; and, finally, when fattened, are found not to be so great consumers, while their propensity to fatten gives

increased advantage to the feeder. The increase in number and value of farm stock has been great within the last few years. All kinds of stock are high. To this, perhaps, may be attributed the fact, that more calves have escaped the butcher's knife the few last seasons than usual. Many good horses are raised here, but not enough for the convenience of our population. Beef is not as high, in proportion, as cows and working oxen. The quarters are worth from $5 to $6 per hundred; hides, $3 50 to $4; good cows, in May last, worth $30 to $35; oxen, $95 to $120.

Sheep.—Sheep husbandry connects admirably with the common branches of farming in northeastern Pennsylvania. The price of wool is now lower than usual, 20 to 50 cents per pound, according to quality. But few fine wooled sheep in the county; flocks are principally native, in many instances crossed with Berkshire. The marshal for the eastern district of Pennsylvania, in 1840, reported 34,878 in this county. I am quite certain there are now twice as many as then. Average pounds per head, 3½ to 4. Mutton is worth, in spring season, 5 and 6; in the fall, 4 and 5 cents per pound. Skins, this season, three to five shillings apiece; winter fleeced and large, more. A friend, in writing to me a few years since, says: "Sheep are to be admired for various reasons; for the warm and healthy article of clothing they produce, for their valuable mutton, for their ability to produce two crops in a year, viz., wool and lambs, for their quietness, and for various other reasons. Unlike other animals, they have no disposition to injure one another. The stronger will not oppress the weaker, and the stranger may eat at the same rack. In this respect, what a valuable lesson is taught to the shepherd by his flock. A sheep may die in debt to its purchaser, but it cannot to him who raised it. The reason for this is plain. It pays all charges once a year, and the moment it has settled for arrearages, it commences to accumulate at a rate which is sure not to fail wherewithal to meet the next annual settlement; and, die when it may, it always leaves a fair compensation to its owner for what little it has consumed of his substance. Notwithstanding the opinion of some men to the contrary, sheep are a greater benefit to a farm than any other kind of stock I have ever kept. They will turn thorns, and briars, and noxious weeds, curses pronounced on Adam and his seed, into useful substances, and in the end cause them to become extinct, and valuable grasses to grow in their stead. Thus do they lighten the toils of man; thus do they turn the curse into a double blessing; yea, treble—his thorny fields into green rich pastures, into warm clothing for his body, and into wholesome food for his subsistence." The wool growing, like the wheat growing business is travelling west and south. If wool should fall off in price for two years to come as it has for the last ten years, it will not be worth the attention of farmers in the eastern and middle States.

Hogs.—No great or material change has taken place in this kind of stock since '47. More pork is made, and more consumed; but not as much in proportion to the population as then. Average

weight per hog, when fatted, about 270 pounds; market value, while fresh, \$6 to \$7 per cwt.

Poultry and eggs.—Dung hill fowls receive increased attention. Poland hens are much sought for—perhaps more than they will be two years hence. The full blooded lay remarkably well; but are quite scrupulous about hatching chickens. Ours had rather lay two eggs a day, and work in the corn field or garden morning and evening, than to busy themselves hatching and taking care of chickens. Eggs are worth 12½ cents per dozen.

Bees, like the husbandman of northern latitudes, have a short summer in which to procure provisions for a long winter. But so far as I know they are as healthy in this as in any other section of country, and as seldom die of starvation. Average yield per hive 45 pounds. Market value 12½ cents per pound. No material change since 1847.

Manure.—Less attention is paid to the preparation and application of manure in this county than in many other sections of Pennsylvania. Barns and stables are not often moved for the purpose of getting rid of a troublesome manure heap; but manure is often permitted to accumulate about them and waste before it is removed to the field. Justice to our farmers, however, requires that I should report great improvement in saving and management of manure, and making of compost for top dressing, &c., since 1845.

Wages of labor.—Young men hired for farming last season, received by the six months, 12 to 14 dollars per month and boarded. Day laborers, at building stone fence, haying, and harvesting, one to one and a half dollars. Planting, hoeing, &c., 75 cents. Common hands in winter, preparing fencing and firewood, threshing, &c., 62½ to 75 cents per day. Mechanics, \$1 to \$1 50. By the month, from \$25 to \$35. Female domestics, \$1 to \$1 50 per week. For attending the sick, frequently two dollars per week; sometimes more; seldom over paid.

Wayne County Agricultural and Mechanics' Arts Society.—This society was organized in 1847. About \$200 paid in. Paid out in premiums, at fair in October, about \$90. For printing, &c., \$20. Present in hands of treasurer \$100. Pope Bushnell, president; post office address, Bethune, Hinsdale. Samuel E. Dimmick, secretary. The prosperity of our agricultural society is flattering. We had an interesting exhibition this season. In all probability our annual fair will elicit much greater curiosity, and be increasingly advantageous.

Thus, dear sir, have I, at much greater length than I, intended, replied to most of the inquiries in your circular. If any part of my response can be of service in enabling you to make out your next annual report, I shall feel amply compensated for the little time I have spent in preparing it.

I have the honor to be, with respect and esteem, your obedient servant,

POPE BUSHNELL.

Hon. EDMUND BURKE.

Note.—Paul S. Preston, esq , has resigned the office of president of our agricultural society. I have been in due form chosen

P. BUSHNELL.

DELAWARE.

Sir: With this you will receive a statement of some of the principal crops grown in school district 58, taken as a data whereby an estimate may be made of the crops grown in the entire State of Delaware.

The following gives the estimated crops for 1847 and 1848:

Bushels of wheat.—In 1848, 14,392; in 1847, 12,333. Increase, 2,059.

Bushels of oats.—In 1848, 31,838; in 1847, 25,617. Increase, 6,221.

Bushels of corn.—In 1848, 41,260; in 1847, 42,718. Decrease, 1,458.

This shows an increase in wheat of 2,059 bushels, of 6,221 bushels in the oat crop, but a falling off of 1,458 bushels in the corn crop. This latter was very much lessened (say ten per cent.) in consequence of dry weather in the latter part of July and August.

The quantity of seed wheat sown varies from $1\frac{1}{6}$ to 2 bushels to the acre. It will be seen that the fields which were sown the thinnest produced the most wheat to the acre. One field, (86 acres,) upon which 103 bushels of Mediterranean wheat was sown, produced full 2,400 bushels, or nearly 28 bushels to the acre—over 23 bushels for one bushel of seed sown.

The average acreable product of each of the crops grown was about 14 bushels of wheat, $26\frac{1}{2}$ bushels of oats, and $28\frac{3}{4}$ bushels of corn to the acre.

School district No. 58, Newcastle county, and State of Delaware, is divided into 24 farms, cultivated as follows:

1848—Wheat	1,020	acres.
" Oats	1,144	"
" Corn	1,436	"
" Potatoes	14	"

The usual course of tillage is a five field rotation. This system has varied more or less, as the price of grain has varied in the market. The regular course is, 1st, corn; 2d, oats; 3d, wheat; 4th, clover; 5th, pasture. This system, adhered to, will show 6,230 acres under cultivation and pasturage, leaving 1,993 acres, or something over one-quarter, uncultivated or in wood land.

There are but few acres of this district but what are susceptible of high cultivation. This is not far from the ratio of the cultivation in the unimproved land of the county of Newcastle. North of us, in the neighborhood of Wilmington, the land, although not so good naturally, is more highly cultivated. South of us, and

further from the market towns, there is more wood and uncultivated lands.

The proportion of uncultivated land in Kent county may be put down at one-half, and that of Sussex county at more than three-quarters. The land in the entire State is in a healthy condition of improvement, and so is also the entire peninsula from the Pennsylvania line to Cape Charles. Some of the most rapid improvements that I have heard of on our poor old worn out lands, so called, have been made by our neighbors of Cecil county. Cornelius Smith paid $7 per acre for land a few years since, and, by improvements, he has raised its value so that he has recently been offered $90 per acre. Many instances might be cited where land, but a few years ago deserted by the owners as not worth cultivation, has been resuscitated, and now produces from 60 to 80 bushels of corn; in some cases over 100 bushels have been reported, and from 30 to 50 bushels of wheat to the acre.

The most approved manure for the renovation of these worn out lands is lime and clover, with a free use of plaster. But how is this to be applied? Plough in the autumn pretty deep; then spread 40 or 50 bushels of well slaked quicklime to the acre on the ploughed ground. In the spring plant with corn, sow wheat in the growing corn early in August, or oats in the spring after; but in either case, sow about one bushel of clover seed to every five acres of wheat or oats. Let your clover grow until August of the fifth year without either mowing or pasturing, not forgetting to sow plaster, at the rate of one bushel to the acre, at least twice. Let the first dressing be as soon as the clover is up in the third year, and also in the spring after—the earlier in the spring the better; let the clover grow until the August of the fifth year without either mowing or pasturing; then turn under all of it well with the plough, (Prout's No. 50, or some other plough that is quite as good;) harrow lengthwise with a light harrow, so as not to disturb the sod, and then roll it; immediately, before sowing with Pennock's drill, one bushel of seed to the acre, and you may be pretty sure of twelve bushels of wheat to the acre or more for one sowing. Pursue this course for three full rotations, and you may fairly count on twenty bushels of wheat to the acre. More than twenty has been obtained by this course in No. 58. This course of rotation is recommended because it is known to have succeeded well. The concentrated manures might be used to force on heavy crops at once, but not with as much certainty and economy as the lime and clover.

But little attention is paid to any other of the branches of agricultural industry called for in your circulars, except in about the proportion of the increase of population, which you may put down for Delaware now at least 100,000. The city of Wilmington, as well as many small towns in the State, have doubled their population since 1840. Our farmers, too, have concluded to remain in Delaware, where, for a series of many years, they have been getting an average of $1 25 for wheat, and 60 cents for corn, rather than go to the west. I still adhere to my estimate of the value of straw

and corn fodder. The prices I fixed were based upon the value of wheat and corn in Delaware. In the east, where grain is higher, the price of corn and fodder is increased. In the west, where corn is worth but $12\frac{1}{2}$ cents, then the value of straw and corn fodder falls in the same proportion. I have been offered $5 per ton for my straw on the farm by men who have presses, and who can press it and take it to Philadelphia, where it brought, last spring, from $10 to $12 per ton. The price of straw this day, 8th January, 1849, on Pennsylvania avenue, Washington city, was 60 cents per hundred pounds. It sold on Wednesday last, in Boston, at 70 cents for the same quantity. Straw is used in the city for feed for stock, cut up and mixed with shorts, rye, or Indian corn-meal, and for litter for stables, and for packing crockery ware and other merchandise; and also by the hog slaughterers.

One firm in Baltimore has slaughtered over 10,000 hogs for the British market this season; and instead of scalding, they singe the hair off. The process is this: They have brick buildings about 12 feet wide by 30 feet long, with high stories, so as to keep the flames within the buildings. They bring in about twenty in a row at each singeing, and place the hogs first on their bellies, with feet spread out, so as to get as much surface as possible; then on, around, and between them, they scatter straw rather loosely, so as to make a quick flame, which will burn the hair without scorching the flesh of the hog. After the first firing, they then turn them down on their sides, give them another covering, then turn them again; and after three firings, which require but a few minutes in each operation, they are removed to another apartment, where they are shaved, hung up and dressed, ready for the packers, consuming, by the three firings to each twenty hogs, about 400 weight of straw, or about 25 pounds to each hog.

The price of straw and corn-fodder may just as well take its value at the city or markets where it is consumed, and where it commands the highest price, as these are the places where the grain—wheat and corn—took its price, that seemed to swell the value of exports so enormously high the past two years. Much of the corn shipped abroad the past year was purchased in the west at $12\frac{1}{2}$ cents per bushel. Indeed, notwithstanding the foreign demand for corn, owing to the famine in Europe, yet it was as low as 17 to 18 cents in St. Louis, for months together, in 1848, although that corn had been brought, much of it, no doubt at least 500 miles by steamboats, and paid two cents on the commission out of that, reducing the low price of 18 cents at least one-third, if not one-half. Corn is now what tobacco was in Virginia in times past; it is the best basis for all our calculations. The value of our lands depends upon the price that corn will bring.

In your valuable report of 1847, you presented a table which showed that our exports of corn for 25 years, from 1820 to 1845, had averaged less than half the growth of Delaware, not one-fiftieth part of the growth of Tennessee, being only about 1,400,000 bushels per annum. I have no means of ascertaining the amount of any kind of bread stuff exported for the year ending 30th June

1848, owing to the fact of the report of the Register of the Treasury, for the past year, not being published. Your report of 1847 shows that 6,053,845 bushels of corn were brought from the west by the single outlet of the Erie canal, four times as much as our annual exports to all the world in ordinary seasons. Was it not for the western corn that is brought to our market, Delaware land, and all agricultural products—grain, hay, straw, and corn-fodder—would be much higher than they now are.

We have two agricultural societies, one farmers' club, in Newcastle county; and at least another farmers' club in Sussex county.

1st. The principal officers of the Newcastle County Agricultural Society are as follows:

John Jones, *President*, *Middleton.*
Bryan Jackson, *Recording Secretary*, *Wilmington.*
J. W. Thompson, *M. D.*, *Corresponding Secretary.*

2d. St. George's and Appoquinnimink's Agricultural Society:
Colonel C. Vandergrift, *President*, *Port Penn*, *Del.*
J. Clayton, Esq., *Recording Secretary*, *Chesapeake city*, *Md.*
A. P. Reading, *Treasurer*, *Middleton*, *Del.*

By your computation of the quantity of grain grown in 1847, more than could be consumed at home, you make 173,000,000 bushels of corn, 40,000,000 bushels of wheat.

I know of no better data whereby to come at approximating results than the following:

Population, 20,746,000.

Grain produced.

Corn	539,350,000
Wheat	114,245,500
Rye	29,222,700
Oats, small grain, &c	235,195,450
Potatoes	100,950,000
Total	1,018,963,650

Exported.—Positive surplus.

Corn	20,609,978
Wheat	26,302,431
Rye	240,460
Oats, small grain, &c	758,100
Potatoes	000,000
Total	47,910,969

Home consumption.

Corn	518,776,122
Wheat	87,933,451
Rye	28,982,242
Oats, small grain, &c	234,492,450
Potatoes	100,950,000
Total	911,114,265

Bushels to a person.

Corn	20
Wheat	4
Rye	¼
Oats, small grain, &c	11
Potatoes	4¾
Total	40

By this mode of comparative estimates, it appears that we consume about 40 bushels of all sorts of grain, peas, beans, and potatoes to each individual. This calculation includes the seed, consumption and waste by man and beast. This mode of ascertaining seems to me to be the only one by which we can arrive at anything like an approximation to the true results. Supplies will only keep pace with demand. The heavy exportation of 1846–'47 emptied our granaries, although our supplies had been accumulating for a quarter of a century; during which time, we had not exported over one million four hundred thousand bushels of corn on an average. Contingent surplus we must have, sometimes less, or more, as seasons affect us, which they do, much more than any foreign demand. It will be seen that the foreign demand amounted to only a small per centage of the whole amount produced; whilst it would seem that forty bushels to each individual is a very small amount to cover expenses of seed, consumption by man and beast, and wastage.

The peach crop of Delaware was very full in 1848, perhaps at least half million of baskets in the State, of which the Reybold family may be credited with 125,000 baskets at least; the balance grew in Newcastle, 125,000, and *each* of the other counties of Sussex, &c., 125,000. The average price was very low, not exceeding 25 cents per basket.

I am glad to hear you have determined to institute an inquiry as to the component parts of such soils, minerals, and vegetables that may be sent to you for that purpose, so far as the means within your reach will enable you to do so. I would suggest the expediency of extending the inquiry to that of manufacturers' goods, to wit: How much of the cost of making iron goes directly or in-

directly into the pockets of the farmer, and how much duty-paying goods are consumed by the process of manufacturing in all its manipulation from the otherwise useless ore in mountain or bog, till it is fashioned by the hand of the skilful American artist, ready for the consumer. Extend this inquiry still further to the wool, cotton, and American china fabrics, with its effects upon population and the value of property.

I was led to make the suggestion by the fact of having purchased one yard of British muslin, for which I paid twice twelve and a cents, which muslin weighed one quarter of a pound, which, after being washed and weighed on the same standard scales, showed a falling off of one hundred and eighty grains of starch, made of British wheat, of course. This muslin was called *Ohio extra heavy sheeting*. By carying out this estimate, and fixing the crop of cotton of the United States of the growth of 1848 at 1,225,000,000 pounds, and supposing the whole crop to have been manufactured in the same kind of cloth goods with the same amount of starch in it, this would have given us a market for over 13,000,000 bushels of wheat—American wheat—much more than we have ever sent to England and France in any one year, except possibly in 1847, when the loss to England from potato rot amounted to £33,000,000 sterling—equal to $156,000,000.

A good datum for the amount and value of manure made on a well managed farm, from the produce of the farm, by feeding hay, straw, corn-fodder, and roots, with a little grain, may be found by reference to some of Mr. James Gowan's reports, as published in the Farmers' Cabinet; all of which is submitted.

Respectfully,

J. JONES.

Hon. Edmund Burke.

After my first experiment in sowing wheat with the drill, in which I was successful, I was further encouraged by reading the experience of Jethro Tull, who was a practical farmer, and wrote about 150 years ago. Up to that time, farming in England was at a low ebb, owing to the low price of wheat—the average product not being ten bushels to the acre. The small quantity yielded induced Jethro Tull to experiment with machinery and improved culture, as the price of grain at that day would not justify the farmers in purchasing manures.

His experiments were eminently successful; for in a very few years he had brought up his yield to 75 bushels per acre from 6 gallons sowing with the drill, upon land that but a few years before he could not get 10 bushels from by the old mode of culture. His neighboring farmers were then, as many of our farmers are now, prejudiced against book and experimental farming, and viewed him as an innovator upon their old established customs. They finally came into Tull's plan, and now drills are there extensively used, and but little wheat is sown broadcast in the highly cultivated counties of England.

When I commenced drilling, and for two or three years, I was ridiculed by my neighbors; some would advise me to take the implement home, break it up, and cook my dinner with it.

I, however, disregarded their jeers, and persevered. And now the best evidence that I can possibly bring forward in support of the drill over the broadcast system, is the fact that all my neighbors have adopted the drill for sowing their wheat, and most other small grain; and that we have three or four drill builders besides H. W. Pennock, the inventor of the improved drill, all of whom could not supply the demand for drills for Newcastle county the past season. I think I am warranted in saying that three fourths of all the wheat that will be grown in Newcastle county the next year, will be from land sown with the drill. One of the great advantages of the drill over the broadcast is, that they can be constructed for sowing the concentrated manures, guano, poudrette, bone dust, &c. I have one lot of 160 acres upon which I sowed, at the same time with my wheat, fifteen tons of guano; on a part of which I sowed 300 pounds, and other parts 200 pounds per acre.

The experiments with the drill and broadcast on D. C. Noble's field, resulted in a yield of 27 bushels per acre of broadcast, where two bushels had been sown; and 35 per acre, where $1\frac{1}{4}$ bushels had been sown with the drill; land similar in every respect; the variety of wheat Mediterranean; showing an increase in favor of drilled (including the saving of seed,) of $8\frac{1}{4}$ bushels to the acre. See C. Noble's letter as published in the American Farmer.

The yield of additional straw on the drilled acre, 12 per cent.

Yield of additional wheat on the drilled acre, 27 per cent.

Another experiment by a Pennsylvania farmer, published in the October number of The Plough, Loom, and Anvil, was equally favorable to the drill.

I am much in favor of sowing with the drill, and of thin sowing. I harvested 24 bushels to the acre from a field of 80 acres in 1847, from $88\frac{1}{2}$ bushels sowing with the drill. This field had had a dressing of 40 bushels of quick lime to the acre in 1838. In 1846 I ploughed in and covered well (say 6 or 7 inches deep) a heavy growth of clover, which had neither been mowed nor pastured that season; harrowed twice lengthwise with the light harrow; then sowed with the drill as above described; all lengthwise with the ploughing; rolling before drilling would have been much better; I rolled my field the past season just before seeding; rolling should never be done *after* drilling.

Wheatland, *February* 7, 1849.

Hon. E. Burke: The enclosed paper on the subject of straw and corn-fodder, as provender for stock, and the manner in which it should be used, is from one of the best and most experienced horse masters in this country.

I remain yours, respectfully,

J. JONES.

PORT DEPOSITE, *February* 3, 1849.

DEAR SIR: Yours of the 1st instant came duly to hand, inquiring of me the value of straw and corn-fodder as provender. Good clean wheat, rye, or oat straw, is always valued at half the price of hay, provided the distance to haul it to market does not exceed three miles. When hay is worth $15 per ton, if the distance is greater, the charge is more. Corn-fodder, when well cured, will always command as much as good hay. The fodder is principally used for milch cows. When I can buy good clean wheat or rye straw at half the price of good hay, I prefer it to hay for horse feed; and at all times, when I can get straw, I feed it to my horses in preference to hay, for the reason that hay has a tendency to make a horse short-winded. And I have known instances where horses have been kept all winter on hay, without grain, and were not worked any to require grain, and when spring came, they had the heaves. And I have also known horses have the heaves that were cured by feeding them on clean straw, with a little grain; and I am fully convinced that a horse that is constantly worked as a stage horse, carriage horse, or saddle horse, will stand more fatigue, and his wind will be better, by being kept on oats, or corn, and the clean straw, than he would, if he had the hay.

But when you feed corn, it is important to give the horse plenty of salt. When I feed corn altogether, I make a tub full of salt and water, (about one gallon of salt to twenty gallons of water.) I then put the corn (in the ear) in this pickle, in the evening, what I intend to feed in the morning; and put in, in the morning, for noon; and put in at noon for feed at night, &c., and give plenty of straw with it, and horses will stand the heat of summer, as well as they would on oats and straw; and I am confident they will stand it better than they would, if hay were substituted.

I do not wish to be understood to say that a horse would do better on straw alone, than he would on hay; but if you will take straw, and take the balance of the money in favor of the straw, and buy oats and corn, and feed it with the straw, which will make the same cost, then your horse is better than he would be on hay alone. But when you take a horse that is always grained fit for service, you save by the straw.

In 1847, I paid for wheat straw, $8 per ton; and hay sold in that year at $16 to $18 per ton. In 1848 and at present, I am paying $6 per ton for straw, and hay can be bought for $10 per ton.

Inquire the advantage of the use of clean straw of some of the old northern stage contractors, and I think they will agree with me.

I remain, with respect, your most obedient servant,

J. J. HECKART.

Mr. JOHN JONES.

Middlebrook, Montgomery County, Md.,
February 11, 1849.

Sir: Montgomery county was formerly (unfortunately for her) a tobacco growing county, which impoverished her soil to that degree that it was scarcely worth tillage, except on alluvial bottoms, and on small lots around the mansions of the residents; but within the last four years the improvements in many parts have been very considerable, taking into view the limited resources of the inhabitants and the costly material (guano) used in restoring it. In 1847, there were upwards of 100 tons used within a few miles of me, and about the same quantity in 1848. The amount, I have no doubt, would have been much greater, could it have been procured in proper season and at a *suitable* price; in fact, I believe the amount would only have been limited by the *means* to procure it. The effects realized by the application of guano have been so favorable on a great portion of our worn out lands, as to create almost as great a fever to procure it as appears to affect some sections of country at the present time in regard to the gold region of our newly acquired territory; and could this desire be gratified by bringing the article within reach of those disposed to use it, the advantage to the country at large would, no doubt, (in proportion,) be as great. The newspapers announced last year that a treaty had been concluded between our government and that of Peru. The particulars of that treaty, or whether anything relative to *guano* was embraced in it, has never transpired, (that I have seen.) It would be gratifying to know if the monopoly of the article by an English house has been removed, or whether our vessels are allowed to bring it direct. On an article of so much importance to Maryland, Virginia, and other portions of our Atlantic sea board, the restrictions should be as limited as possible.

The amount of wheat raised in 1848, in consequence of the use of this manure, I believe to be double of that of the year 1847; not that the average crop was so much better, but owing to more having been sown on land that, without this or other artificial aid, would have yielded little or nothing. The rye crop has failed for so many years past to yield a remunerating profit, that it had almost been abandoned. I, however, procured a small sample of "multicole" from my friend, Mr. John A. Smith, of Washington, a few years since, which has succeeded admirably. The yield last year, notwithstanding it was prostrated by a severe storm, was nearly an average of twenty for one sown. The length of the straw was, on an average, upwards of seven feet; before it was prostrated it was the admiration of all who saw it. One year the yield on good land was forty for one sown. Indeed, from my experience, I view the introduction of the "multicole rye" as a great acquisition to every section of the country where the common rye has proved a failure, as it has in ours for so many years. If you think it worth your notice, I could supply you with a bushel or two for distribution; and next year (from present prospects) will have a quantity to dispose of. Barley—none raised here. Oats

—about equal to 1847; almost a failure, owing to drought and other causes. Buckwheat, (where guano was used in small quantities,) four for one of 1847. Indian corn—an average crop. Potatoes—better than 1847; not large, but numerous, and nearly free from rot; the Foxites that I planted, in particular. Hay—destroyed by freshets on low lands. Hemp and flax—little or none raised. Tobacco—the quantity planted small, in proportion to former years; quality fine, and yield good when guano has been used. Probably one-third of land in cultivation of some sort; perhaps not more than one-fourth. Rotation of crops—corn, oats, clover, wheat. Clover, wheat, clover, and then if foul, corn, &c. My plan has been to encourage clover; never to feed or cut it, but turn *all* under with a view to improvement, using gypsum freely. Root crops and pod fruits—a plentiful supply for home consumption, few or none for market, being too remote. Orchards on the increase. Butter and cheese—stationary; raising stock, ditto, ratherimproved. Sheep, same. Most farmers keep as many as will supply their common domestic purposes. At my factory I suppose I card and manufacture from 1,200 to 1,500 pounds wool per annum. Hogs, (only conjecture,) about an average of 15 per family; weight, from 125 to 175 pounds, though numbers will reach 200 to 250, but others again will not reach over 100 pounds. Bees do not succeed well for want of attention; destroyed by web worm. Colored farm hands from $60 to $75 per annum; say, average $65. Mechanics for $1 to $1 25, and found. Millwrights $1 50 per day, and found. Price of transportation by wagon from $4 to $5 per ton (less by canal) to Georgetown, D. C.

The wheat sown in the fall of 1847, was put in in good, clear weather, and looked very promising until some time in the spring, when we had a long drought; so much so that we despaired of making our seed; but just before harvest there was one or two showers which revived it. The weather whilst cutting our grain was fine; but before securing it we had one week of constant rain; but being cool, did no further injury than to occasion a loss in opening and again securing it. The present growing crop is promising, particularly the late sown; the early has been a good deal injured by the fly.

Respectfully, your most obedient servant,

T. C. CLOPPER.

Hon. EDMUND BURKE,
Commissioner of Patents.

WOODLANDS, *February* 18, 1849.

SIR: It is my intention to send my wagon to Washington tomorrow, and I will send a bushel of multicole rye by it to you, as requested in yours of the 16th instant, with instructions to be left at the Patent Office. It will probably arrive on the evening of the 19th or morning of the 20th. As it is for distribution, I make no charge

for the rye, being desirous of contributing my mite towards advancing the agricultural interest of the community, and in a pecuniary point, of too small value to put you to any further trouble.

I am tolerably well fixed for experimenting on any grain or grass seeds that may be likely to prove advantageous to the country; likewise roots, &c., from abroad, or different sections of our country. If it meets with your approbation, and is conformable to your rules to distribute to *private* individuals any articles of this kind, it would afford me pleasure to be the recipient of such small favors occasionally.

In my last communication I omitted stating an experiment I had made with regard to the production of chess or cheat in wheat, for my own satisfaction. In the fall of 1847 I directed my manager to select about a peck of that article, to be nicely cleaned, and land of an excellent quality, prepared in the best manner, as if for wheat, on which to sow the cheat without any admixture whatever. This was done, and the result was the production of neither cheat, wheat, or any other vegetable substance, until the warmth of the spring brought up weeds, grass, &c., common to our country; from which I infer that there is no danger to the farmer from a reproduction of cheat that may inadvertently be sown with wheat, and that *cheat* is nothing more nor less than *degenerated wheat.*

I have upwards of twenty acres in orchards, containing all the most celebrated and valuable varieties in our country, and amongst them one, in particular, superior to anything of the apple family I have ever met with; samples of which I have sent to some of my friends in Baltimore and the district, who all have told me that my apple surpasses anything of the kind they have ever met with in their markets, and that they have never seen any resembling it. The late Matthew Carey, esquire, of Philadelphia, procured it, among many others, for me at the nursery of the celebrated Mr. Cox, of New Jersey, many years since.

Not wishing to give you any further trouble, I will conclude by saying that I view your "Reports" of immense value to the country; they should be spread "broadcast" through the community. I see your last eulogized in the papers as even superior to its predecessors. I hope it may be republished, so as to be within the reach of private individuals who may be desirous of obtaining it.

Respectfully, yours, &c., &c.,

F. C. CLOPPER.

Honorable Edmund Burke,
Washington city.

London Bridge, Princess Anne Co., Va.,
October 16, 1848.

Dear Sir: I have received your circular asking for the agricultural estimates of the present year, and have the honor to forward

you, with this note, a table of statistics, which, though confessedly imperfect, may possibly assist you in making up your report.

A marked similarity will be observed by comparing my estimates for the present, with those for the past year; and this similarity may be traced to the geographical position of our county, which has but few natural advantages, and is sadly deficient in capital. These disadvantages conspire to keep us measurably stationary, even in this age of "steam and telegraph;" and while the more important elements of good living are cultivated with an improved degree of attention, and a marked increase in productiveness, the "*fancy stock*," is turned over to the management of other hands.

The information which I have gathered upon the subjects enumerated in your circular, has been collected at different periods, and at a season when my professional engagements leave me but few spare hours to devote to other employments; and you will, consequently, perceive a great lack of *order* in the compilation which I have made. This deficiency, you will feel yourself at liberty to supply, by a better and more systematic arrangement.

I have reserved for this communication what information I possess, upon the "state of the weather, &c.," as also some additional remarks, which may be necessary for the better understanding of my estimates.

STATE OF THE WEATHER.

Articles.	At planting.	While growing.	At harvest.
Corn........	Wet and cool.	Dry; only two or three rains during growth..........................	Not yet harvested.
Wheat	Wet and cool.	Wet first months, very dry latter	Very dry.
Oats	Wet and cold.	Very dry...........................	Dry.

TEMPERATURE, &c.

Months.	Mean monthly temperature	Prevailing winds.	Prevailing clouds.
1847. October...	56°	NE. NW.....	Cirro-cumulus. Nimbus.
November.	54	NE. N. NW..	Horizontal sheets of cirrus passing into cirro-stratus.
December.	49	N. NW......	Stratus. Cirro-stratus.
1848. January...	46	N. NW.....	Stratus seen frequently at evening.
February..	46	N. NE. NW..	Nimbus.
March....	45	NW.........	Cirro-stratus. Nimbus.
April.....	50	SE. S........	Cirro-cumulus.
May	63	S. SE. SW...	Oblique cirrus. Cirro-stratus.
June	69	W	Cumulus.
July......	69	W	Cumulus.
August....	78	W	Cumulus. Cirro-cumulus.
September.	77	E. W.	Cirro-cumulus.

Mean annual temperature 58.7-12.

I begin the table in October, 1847, because the seeding of the wheat crop commenced in this month, and it is consequently included within the agricultural year.

The mean quantity of rain which fell I have no means of ascertaining.

Indian corn is the great staple production of Princess Anne, and there has been a rapid increase in the crop for the past five years. The crop of 1848, as compared with 1844, will, I am conscious, exhibit a difference in favor of the former year of 30 per cent., and this increase is the result of an improved system of culture, and the great demand for this element of food, in consequence of the repeated failure of the crops of the old world. In March, 1847, the price of corn ranged in the Norfolk market from 80 cents to $1 25 per bushel; and, although immense quantities were poured in from the rich lands of Carolina, and from the counties across the Chesapeake, yet the supply was not equal to the demand. In consequence of this extraordinary call for Indian corn, greater attention was bestowed upon the crop, and wider breadths were seeded in the spring of 1847. But the European crops of '47 turned out to be heavy; the sliding scale of duties was imposed upon the grain by the British government, and the price of corn declined to 60 cents. Notwithstanding the declension, the crop seeded in April last was larger than the preceding, and will exhibit a considerable per cent. increase. I have placed the increase at five per cent., which I think is a fair estimate. The fodder is now housed, and the corn crop placed beyond the probability of serious damage from wind or flood; and I hazard nothing in saying that, notwithstanding the prevailing dry weather in the growing season, the crop of Indian corn for 1848 is the heaviest, and most productive, which has been grown in the county for the last twenty years.

Annexed is the supposed cost, per bushel, of raising this crop.

Breaking up one acre of land, and every subsequent ploughing, while growing........................	$3 00
Seed corn, planting, harvesting, and interest on land...	1 50
Shelling and transportation to market................	2 50
	7 00

Average yield, 20 bushels,÷$7=35 cents per bushel.

Yield, 20 bushels,×60 cents, average price=$12—$7; profit, $5.

Oats.—The crop of oats has decreased in quantity for the past three or four years, as rapidly as the crop of corn has increased. The protracted drought of the growing season, made the present crop very short, and the 5 per cent., given in the accompanying table, is a very liberal estimate. The quick growth of the oat crop exhausts the land to such a degree that it is becoming exceedingly unpopular; and this, together with the ascertained cost of raising, has materially contributed to its decrease. The farmer now seeds but little more land than will yield him a supply of oats for his own use, either as a change of food for his team ,or

to supply any deficiency consequent upon the too close sale of the corn crop.

Cost per bushel of raising oats:

Ploughing, seeding, and harrowing one acre of land....	$2 00
Seed oats, and interest on land........................	1 00
Harvesting, threshing, and transportation to market....	2 00
	5 00

Average yield, 15 bushels, ÷$5=33⅓ cents per bushel.

Yield, 15 bushels, ×40 cents, average price, $6—$5; profit, $1.

Wheat.—This crop has increased very much during the last five or six years, and but for the rust, fly, &c., which render it rather an unsafe crop, it would perhaps be more generally cultivated, notwithstanding the unfitness of our soil for its culture. There are some fine wheat lands in the county—lands which may compare with any in the wheat growing counties for productiveness. But, in the main, the soil is rather light and sandy for its general cultivation. The early red and purple straw, are considered the most productive varieties, and the average yield, as marked in the table, may be set down at about 10 bushels per acre. The samples which you kindly furnished me with I have placed in the hands of gentlemen who are engaged in the culture of this grain, and whose lands are suitable to its growth. I hope during the ensuing summer to give you the result of these plantings.

Cost per bushel of raising wheat:

Ploughing, seeding, and harrowing one acre of land....	$2 00
Seed, and interest on land............................	2 25
Harvesting, threshing, and transportation to market....	2 25
	6 50

Average yield, 10 bushels, ÷$6 50=65 cents per bushel.

Yield, 10 bushels, ×$1, average price, $10—$6 50; profit, $3 50.

While the foregoing estimates speak but poorly for the condition of our agricultural affairs, they teach us that the corn crop is the most valuable, and the oat crop the most worthless.

Cattle.—We cannot boast any valuable varieties. Some unsuccessful attempts have been made to introduce the Durham and pure Ayreshire breed, but our stock remains the old "pine barren" race which has grown among us for the last century. And yet large numbers of cattle are annually raised in Princess Anne. The county cannot be classed as a grazing county; but vast marshes of luxuriant grass skirt the ocean near the line which divides Virginia and North Carolina, and to these marshes herds of cattle are driven in the fall months, and left to winter. They usually thrive without any extra feeding, and are driven home fat during the ensuing summer. The city of Norfolk being an important naval depot, is necessarily a large beef market; and the cattle thus raised are sent upon the hoof to the city butchers, who slaughter for city and naval supplies. A cow which will net 300 pounds,

will command $15; and a steer of 600 pounds weight will sell for $30, being just 5 cents per pound; which is the average marked in my sheet of estimates.

The cost of raising cattle upon the marshes is very small. It is true that casualties sometimes occur which seriously affect the interest of the cattle breeder. In March, 1845, a violent storm prevailed for two days, and the waters of the Atlantic burst their prescribed bounds, inundated all the marshes, and indeed passed, for several miles, over the highlands. It is estimated that 2,500 or 3,000 head of cattle perished in this storm, beside large numbers of sheep and swine. The labor of years was thus swept away in a moment, and the energies of some of our enterprising citizens partially paralyzed. Horses, hogs, sheep, cattle, poultry, &c., were drowned in the farm yards, at a distance of two miles from the ocean; and even families were compelled to retreat to the upper stories of their dwellings to save themselves from the advancing flood. Such a calamity, however, had no precedent in the memory of "the oldest inhabitant," and possibly will not befall us again during the next century. While, then, a visitation of the above nature may blast the fruits of industry, and the hard winters may destroy, annually, a portion of cattle sent to the marshes, and thus reduce the net gain, I incline to the opinion that this mode of rearing cattle is exceedingly profitable.

The wages of labor.—I have marked mechanics at $1 to $1 50 per diem and board; agricultural laborers, at $5 per month and board; female domestics, at $2 to $2 50 per month and board. The adult male slave hires, during the present year, at $70 to $80 per annum; to which we must add his board, clothes, taxes, &c., which will amount to at least $45 more. Assuming $70 as the *maximum* hire, the cost of the male slave reaches $9 7-12 per month; and this sum is given for a class of laborers notoriously indolent, and who perform at least one-third less work than the white laborer. The female slave hires at $40 to $55, which, at the lowest estimate, brings their hire at $7 per month. The slave is not exposed to wind or weather more than the white laborer, and there is no reduction from the hire of the former by reason of sickness or casualties; which circumstance sometimes makes a very great addition to the real expense of the slave. I should be pleased to write down a few reflections upon the comparative value of slave and white labor; but I am reminded that such a course would possibly involve a question of political ethics; the discussion of which would be inappropriate in a paper of this character. I, therefore, dismiss this branch of inquiry.

Probable proportion of cultivated to uncultivated lands.—In my last report to the Hon. Commissioner, I represented 12½ per cent. as the probable proportion of cultivated to uncultivated land. Under the head of "uncultivated," I, of course, classed marshes, swamps, forests, sands, &c., and all other places not under tillage. I thought the per cent. a fair one; but a judicious friend, whose judgment may always be relied upon, suggests 20 per cent. as a nearer approximation to the truth. I have, in the present instance,

adopted his view upon this subject; and you will find the *latter* figure placed against the question of cultivated and uncultivated land.

The *pea crop* is increasing. At the final ploughing of the corn crop, the land between the rows is sown broad cast with the corn-field pea. This crop shades and improves the land, and produces a fine yield. The pea is sold for about 70 cents per bushel; but the process of picking is so very slow that but few more are saved than may be necessary for the succeeding crop. Enough to seed the land are housed; and, after the corn is harvested, the hogs are turned in upon the remnant of the crop, which is speedily devoured, to the manifest improvement of the grunters. The corn which, but for the pea crop, would necessarily be consumed by the hogs, is thus saved to the farmer, and the pea becomes a subject of profitable culture.

Hogs are raised by the owners of oak and beech lands, with but little expense in those years which are termed "*good mast years;*" that is, when there is a large yield of acorns, beech nuts, and chinquepins. During these "mast years," the hogs are suffered to go at large, until they become fat, when they are butchered from the woods. An opinion prevails that, if swine are fat upon the mast, they decrease in weight if put up and fed upon corn or peas. Hence, they are slaughtered while at liberty in the forests. The pork thus raised is easily detected by the purchaser, from its flabby and soft appearance, and sells at $1 50 per hundred less than corn-fed pork.

It is, perhaps, unnecessary to extend this communication. I appreciate your noble desire to furnish the country with a faithful portrait of its actual condition; and regard the annual report of the United States Patent Office as one of the most interesting and valuable publications of the republic. Whatever of information I may possess upon those subjects which you have made matters of inquiry is at your disposal. That information is so very limited, that it will hardly pay you for the perusal. Limited, however, as it is, I venture to forward it for your inspection; and, while I cannot claim for my estimates the merit of entire correctness, I am persuaded that they approach very nearly to the truth.

I shall be pleased at all times to give you any assistance in my power, relative to the agricultural and other statistics of the county, and hope you will feel yourself at liberty to command my services.

With sentiments of respect, I remain, very respectfully, yours, &c.,

ROBERT B. HALL.

Hon. EDMUND BURKE,
Commissioner of Patents, Washington, D. C.

SOUTHAMPTON COUNTY, VIRGINIA, *December* 4, 1847.

DEAR SIR: I have been so occupied that my attention to your circular has been delayed to a later period than I designed, but so meager is this detail I have to give that it can be of no moment. Permit me, in the outset, to return my thanks for your report of 1847. Such is the varied and useful matter disseminated thereby, that it cannot fail to be of great service to the agricultural community. I am under further obligation for a package of seed, especially the little parcels of wheat; they have been sown, vegetated well, and look promising.

Having premised this much, I proceed, to the best of my ability, to respond to your inquries so far as they relate to our staple products of the present year as contrasted with the crop of 1847. The Indian corn, or maize crop, came in very well, and at an advance of 15 per cent. on the crop of last year; yet the arable product will make a beggarly exhibit, not being able to place it higher than 10 bushels per acre. Of course, those who have considered 15 bushels per acre the smallest quantity that would pay the expense of tillage, must conclude we are on the high road to pauperism nevertheless, our population subsists in great comfort.

The season with us for planting the maize crop, is from the 25th of March to the 1st of May, depending on the peculiarity of the soil and state of preparation, though the crop will mature on good ground if put in by the 1st of June. Last spring was cold and backward. In June we had an excess of rain, which was very injurious, but in the month of July, the season was peculiarly auspicious, and crops improved rapidly. About the middle of August, when the corn crop no longer stood in need of genial showers, a remarkable drought set in, which continues even at this time—the farmer now finding it difficult to get his corn converted into meal, the mills all being still for want of water.

The pea crop has proved uncommonly short, not more than half an average crop, and 25 per cent. below the crop of last year.

Potatoes, (sweet,) contrary to all expectation, came in well. The general impression was, that the drought, so fatal to peas, must seriously affect potatoes. But a full average crop has been gathered in, being 25 per cent. less than the crop of last year, which was injured by an excess of rain. The potato crop varies from one to two hundred and fifty bushels per acre, depending on the adaptation of the soil, and pains taken to prepare and fertilize it.

The wheat crop was good, though I can give no advance on the crop of last year. The spring and early part of the summer were highly auspicious to the healthy condition of this plant, preserving it free from disease. The berry was consequently good, with some more straw, but the heads are shorter than last year; the average product not exceeding that of 1847, which I set down six bushels per acre, bearing in mind that I speak only of my own county. One bushel of seed per acre is the quantity most usually put in the ground. The variety mostly cultivated is a red bearded wheat, with us called

the golden chaff. The red May was growing into favor, but it lost reputation in consequence of great injury in 1845 by a late frost, which nearly destroyed the crop by reason of its early maturity. The white flint and purple straw have been sufficiently tried and discarded. The oat crop was nearly a failure, from some cause, probably the cold spring. There was generally a thin crop on the land, and about the season for cradling, we had a gale which so prostrated the crop that few attempted to save more than seed. Of apples we had a good average crop.

As to agricultural societies or clubs, we have no such machinery, and I fear it will be a long time before we shall. The last attempt at a society proved a signal failure. As a beginning, clubs would probably do better; and if once well established, they might lead to an organized society.

We farm it in a manner so very promiscuous that it would be difficult to give, with any accuracy, the cost per bushel of corn or wheat; but it is the generally received opinion among us that less than 50 cents for corn, and 80 or 85 for wheat will not remunerate the farmer for the time and capital employed.

As to individual consumption of breadstuffs and meat, the best guide to an answer is to be found in the usual estimate per annum for an able bodied laborer; that is to say, three barrels of corn and two hundred and fifty pounds of well cured bacon, seldom using either beef or pork. About this quantity is usually portioned out to slaves in weekly allowances. Where families are provided for, the quantity is graduated according to the number and size of the children. I incline to the opinion that peas and potatoes substitute from a fourth to one-third the allowance of bread.

With regard to the portion of our land annually put under tillage, I think I cannot be very wide of the mark when I set it down at one-fifth, bearing in mind that our population, for the most part, cultivate on the two field system, being alternately in corn and peas, and the scant crop of herbage which nature may put forth, without any attention whatever, unless it is in a few rare cases, to the cultivation of artificial grasses. Therefore, it is not to be wondered that our lands are reduced to a low state of production. But a better day is dawning upon us. The people have waked up to the importance of manuring. Much use is now being made of top soil and muck, carried either through the farm pen, or directly from their locality, and spread broadcast upon the land.

With considerations of great respect, yours,

J. D. MASSENBURG,
Jerusalem post office.

Honorable E. Burke.

Home, Warren County,
November 28, 1848.

Sir: In reply to the circular of queries from the Patent Office, 1848, I make the following answer:

The *wheat* crop is estimated at 15 per cent. better than the crop of 1847, owing to the favorable season, more fallow ground being sown, and less corn ground, and but few Hessian flies.

The average quantity of seed per acre will be a shade over 1 bushel per acre. Much the largest nnmber of farmers sow but 1 bushel; another portion sow $1\frac{1}{8}$ bushel; and still a smaller number sow $1\frac{1}{4}$ bushel.

Time of sowing varies from 20th August to 20th October, and sometimes early in November. The time mostly preferred is from 15th September to 15th October.

Harvest commences about 22d June; the May wheat and Mediterranean wheat some eight or ten days earlier. The average this year is estimated at 8 bushels per acre. Price, 80 cents per bushel; and from 20 to 30 per cent. consumed where raised.

The kinds of wheat said to be most successful are the Georgia, Mediterranean, Blue Stem, Zimmerman, White Blue Stem, New York, Genesee, Golden Straw, Holland, and Eturian; the Georgia, White Blue Stem, Zimmerman and Eturian but recently introduced into this county.

I had $3\frac{1}{2}$ ounces of Eturian wheat presented to me last fall, which yielded 32 for one, besides a loss of more than my seed in the field and barn.

The soil most successful for raising wheat is the river bottom, limestone lands, clay lands mixed with limestone and the round sandstone, and the body of land generally between the limestone land and slate lands.

Barley.—None raised in this section of the country, unless very small quantities of spring barley as experiments, of which I do not know the result.

Oats is $12\frac{1}{2}$ per cent. better than 1847, owing, probably, to late sowing. The early sowing nearly a failure. Average seed per acre, $1\frac{1}{2}$ bushels; 15 bushels average crop. Price, from 25 to 30 cents per bushel. All consumed where raised. Time of sowing, from 1st of March to 1st of May. Time of cutting, 10th July to August. Kinds most preferred are the Potato, Siberian, and small black oats.

Rye about equal to last year. Very little sown; unproductive; cause not known; 1 bushel of seed to the acre in many places not producing more than the seed to the acre. Immediately under the mountain, and a few more favored spots, the product is better. Price, about 50 cents per bushel; all consumed in the county. Time of sowing, 1st of August to 15th of November. Time of harvesting, 15th to 20th June. The large white rye used to be preferred.

Buckwheat equal to last year, but less sown. Time of sowing, from 12th June to 15th July; $\frac{1}{2}$ bushel seed to the acre; average, 20 bushels to the acre. Price, 40 cents per bushel. All consumed in the county.

Indian corn is estimated at 25 per cent. better is quantity and quality; cause, favorable season, winter ploughing of lands for crop, and good tillage. The average quantity of seed planted to the acre varies much, say from 1 to 2 gallons. Average per acre

this year, 25 bushels. Price, 35 cents per bushel, delivered. About 80 per cent. consumed where raised. Time of planting, 9th April to 15th May. Commence cutting up corn about 15th September; shuck and house, last of October, November and December. The white and yellow varieties are planted; for home consumption the white is preferred; the yellow is preferred for distant markets. The river bottom, a sandy loam, is preferred for corn. On the improved upland, with a fair season, we make nearly as much corn per acre as on the bottom.

Sweet potatoes.—But few raised; about 1 bushel of seed per acre; product per acre, supposed 120 bushels. This result is only estimated from small patches. Price, 75 cents to $1 per bushel. All consumed in the county. Planted about 10th April; harvested latter part of August, September and October. Spanish and Carolina red most successful. Soil, rich sand or rich gravelly lands.

Common potatoes, about 25 per cent. less; probable cause, early season not so favorable; 10 bushels seed average per acre; product, about 100 bushels per acre. Price, 50 cents per bushel; 80 per cent. consumed where raised. Planting, from 1st March to 21st June; harvesting, 15th June to 15th October. The kinds most successful are Mercer, Pink Eye, Round Blue, Carolina Blue, Roan, London Lady, Blue Eye, &c., &c. Rich sandy loam is probably the best for potatoes; a poor sandy or light soil, well manured with half-rotted barn yard manure, ploughed in, with a favorable season, will produce good potatoes. Previous to harvesting the potato crop, there has been but little complaint of the potato rot. The cause of the rot I cannot account for.

Thomas F. Buck, esquire, planted part of his crop of potatoes in new ground about the 15th of June, protected on the north and west by a large body of wood land—on the south and east, grass and wheat, and about a quarter of a mile from the South river. Many of his potatoes were found rotten in the hill early in the season. Part of his seed potatoes was procured from me. I planted of the same seed 10th of June, in sandy loam, between rows of watermelons, cucumbers and muskmelons; corn on the east, north and west; south shaded by a chestnut tree; and in the range of the shade of the chestnut tree I found five rotten potatoes, that part of the ground being moister than the other part. These, and one rotten potato found in another patch, were all the rotten potatoes found in my crop of about 100 bushels.

Part of my potato crop was planted in ground that had been planted in potatoes the last season, where nearly one-half of the potatoes rotted before taking up. A part planted in ground that had been planted in Indian corn and broom corn the year before, all contiguous, planted at the same time, manured and cultivated alike, no difference perceptible, only that the potatoes were smaller and more of them, and not a rotten potato amongst them. The potatoes were shaded by a few apple trees and twenty rows of corn on the east; on the south, wheat; and west, rye; on the north, a few cherry trees, plum and damson trees; a limestone clay soil, with small round sandstone. I have raised as fine potatoes on

sandy loam as at any other season. I could not discover anything like disease on the potato tops.

Hay is about an average crop; 1 gallon of seed per acre; 1½ tons of hay per acre. Cutting, from June to September. Price, $6 per ton; all consumed in the county. Time of sowing seed: for Timothy, orchard grass and herds' grass, August and September; clover seed may be sown any time in the year. Clover, Timothy, orchard and herds' grass are preferred.

Hemp and *flax*.—But little raised.

Tobacco.—None planted as a crop, in consequence of the low price.

Cotton, rice, silk and *sugar*.—Not cultivated.

From the best information, it is supposed that one half of our lands are in cultivation.

The most approved rotation of crops is, two of clover, one of wheat, corn and wheat or oats; some prefer two crops of wheat after clover.

Root crops and *pod fruits* only raised for family use.

No new products introduced. If any have been sent to the county, the "light must have been put under a bushel."

Orchards.—Increased attention. Small fruits, plums, strawberries, grapes, raspberries, &c., improving.

Dairy.—Butter and cheese on the advance. Butter is worth 12½ cents; cheese, wholesale, from 8 to 10 cents per lb.; retail, 12½. There are some four or five cheese dairies in this county, with from 40 to 60 cows or more at each dairy farm. Robert M. Marshall, esquire, principal proprietor. No opportunity at this time to furnish a detailed statement.

Raising stock.—More attention paid to raising draught horses, and the improvement of stock generally. Beef cattle have been selling a few days back at about $4 per hundred; hides, from 4 to 5 cents per lb.

Sheep.—Stock improving; wool averages 3½ lbs. Factory price, 20 cents per lb. Mutton 4 cents; skins, 12½ to 25.

Hogs about as last year; average 170 lbs. Pork, 4½ cents per lb.

Poultry and eggs.—No perceptible improvement. Eggs, 6¼ cents per dozen.

Bees.—Attention about the same. Average pounds of honey, 2 to 4 pounds per hive; $1 per gallon. From caps, the average is 2 to each hive of 15 lbs. each; price in the comb, 12½ cents per lb.

Manure furnished from farm and barn yard. Make and apply all we can. No new modes adopted.

Wages of labor.—Farm hands average from $7 to $8 per month; mechanics, $15 per month; female domestics, 75 cents per week.

Price of transportation.—Flour, to Winchester, 50 cents per barrel; wheat, to same, 10 cents per bushel; flour, to Baltimore, per river and railroad, 87½ cents per barrel; to Alexandria and Georgetown by the river, 80 cents per barrel.

The "Warren Agricultural Club" organized 15th September, 1848. Robert M. Marshall, president; John S. Davidson, vice president; Walter Bowen, secretary; Robert Turner, treasurer.

Post office address, Front Royal, Warren county, Virginia. Number of members, 17; no fund at the above date. No other industrial association that I know of.

State of the weather at sowing, planting and harvesting.—Much rain at the sowing season in September, 1847, and April and May, 1848; dry in latter part of May and June, and very rainy about the end of harvest. No blight of any consequence, and but few Hessian flies.

The average cost of raising wheat per bushel, at an average of 16 bushels per acre, we put at 40 cents; and corn, under 15 cents per bushel, at 40 bushels per acre.

The probable average consumption per individual is: wheat, 5 bushels; corn, 6 bushels; potatoes, 3 bushels; pork, 140 lbs.; beef, 70 lbs.; mutton and veal, 30 lbs.—making 240 lbs. of meat, independent of a variety of vegetables.

I have about twenty-five in a family. For each individual I kill

one hog; average	170 lbs. pork.
1,000 lbs. beef; 40 lbs. each	40 lbs. beef.
15 sheep, 750 lbs.; 30 lbs. each	30 lbs. mutton.
6 veals, 600 lbs.; 24 lbs. each	24 lbs. veal.
	264 lbs.

I set apart for family use 100 bushels of wheat—4 bushels each individual; 125 bushels corn—5 bushels of corn to each individual; and occasionally killing a yearling or two in the fall of the year, besides chickens, turkeys, ducks and geese; and if that is not sufficient, we kill and eat; to which we add potatoes, cabbages, beans, peas, beets, carrots, parsnips, &c., out of which we also diet our friends and acquaintances when they call to see us.

I also send you a weather table for August, September, October, March, April, May, June, and July. Previous to August I had no instrument whereby to give the temperature of the weather.

In August, 1847—9 days of cloudy weather; clear 12 days; rain, more or less, 15 days.

In September—Cloudy 4 days; clear 22 days; rain, more or less, 9 days.

In October—Cloudy 5 days; clear 20 days; rain, more or less, 9 days.

In March, 1848—Cloudy 13 days; clear 16 days; rain or snow, more or less, 12 days.

In April—Cloudy 10 days; clear 21 days; rain, more or less, or a little snow, 6 days.

In May—Cloudy 4 days; clear 17 days; rainy, more or less, 11 days; frost 2 days.

In June—Cloudy 2 days; clear 19 days; rain, more or less, 6 days.

In July—Cloudy 6 days; clear 20 days; rain, more or less, 8 days.

The whole subject of inquiry is new to all of us, and all now appear willing to aid in giving help to the undertaking; and it has

awakened us up to inquiry and calculations on many questions that we never thought of before.

Accept my thanks for the Patent Office Report of 1847, it being the first I have received.

Very respectfully, yours, &c.,
JOSEPH S. SPENGLER.

Hon. Edmund Burke,
Commissioner of Patents.

Morrissania, Amhurst County,
November 13, 1848.

Dear Sir: In answer to the circular you sent me I will proceed to give such information as I possess.

Tobacco, wheat, and corn, are our principal crops; and, as the increase or decrease of the crops of the present year compared with those of the year 1847 is the first of your queries, I will proceed to answer it as far as my limited information extends.

Tobacco is, I suppose, the most important crop to this section of the State, (though in this county wheat would rank first;) yet in the adjoining counties of Buckingham, Appomattox, and Campbell, tobacco yields the greater revenue, and to the town of Lynchburgh is of much greater importance, as this town has the third largest inspection in this State, and perhaps is the largest in the manufacture of this article.

The crop of tobacco made in Virginia in the year 1847 was far below the average, being only about 36,000 hogsheads; but this was not owing to the seasons, but principally to the price of corn for exportation, which induced the planters to reduce their tobacco crop and increase that of corn.

From the best information I can obtain, the tobacco made this year in Virginia will not much exceed that of 1847, as the season for planting was unfavorable, and the crop consequently late. I suppose the quantity made will not exceed 40,000 hogsheads.

The wheat crop of this year is large in quantity, and of excellent quality, perhaps equal to any ever grown in Virginia, and would have been still larger, but for the highest freshet in James river which has occurred since the year 1795, and several hail storms in the month of May, which destroyed the wheat in many localities.

The corn crop of the present year is, I suppose, above an average one, but at least one-third less than the crop of 1847, which was perhaps the largest ever grown in Virginia. This was owing to the high price this grain sold for in the fall of 1846 and spring of 1847, which induced many planters to curtail their tobacco crop and put their best land in corn; and, in addition, there was a plentiful supply of rain during the corn growing season.

As there is no agricultural society in this county nor in this section of the State that I can give any information about, I will

proceed to your next inquiry of the state of the weather at planting season, &c.

The first crop we plant is corn, as potatoes, peas, &c., are only grown for family use. We usually commence about the first of April to plant our corn, and there is scarcely ever any difficulty about the season. Sometimes it is cut down by a late frost; but this does not injure the crop, as it soon springs up again and grows as vigorously as ever; nor does this crop require much rain until July; and during this month and August frequent and plentiful showers are necessary to cause a large yield.

For planting tobacco, however, it is quite different, and rain in sufficient quantities thoroughly to wet the ground is then necessary. The best time for setting tobacco plants is from the 1st to 10th of June, but frequently this is done as early as the 20th of May, and sometimes as late as July. The present year there was a plenty of rain for planting tobacco in May; but the month of June was dry; consequently much of the tobacco was planted in July, and, therefore, the crop will be less than an average one.

We usually commence sowing wheat between the 20th September and 1st October, and finish between the 1st and 10th November. This fall has been very dry for seeding, and those who did not avail themselves of the wet weather in July to break up their clover fields, found it difficult afterwards to fallow; yet there has been an average crop sown.

The crops of the present year have sustained but little injury from blight or insects; some of the late wheat was destroyed by rust, but much less than usual; indeed, the quantity was so small as to be scarcely worth noticing, and the ravages of the Hessian fly were inconsiderable. A new enemy to the wheat has made its appearance, in that sowed this fall; I mean the grub worm, which has entirely destroyed the wheat in some places and rendered re-sowing necessary; and as this fall is the first time I have ever seen the wheat injured by the grub worm, I thought it well to mention it, though the injury done is scarcely sufficiently extensive to make it a subject of serious comment.

Your next inquiry, the cost of raising wheat, corn, &c., is one of great difficulty, and one on which but few farmers would agree; for the different qualities of land and the various crops made at the same time, would cause different estimates to be made. I have, however, paid considerable attention to the subject, and from calculation and reflection, I have come to the conclusion that on lands which will produce from ten to fifteen bushels per acre, the average cost of raising wheat in this county (if it were a certain crop) is about 40 cents per bushel; but as it is liable to so many casualties, such as rust, fly, and falling before it is ripe, that at least 50 per cent. should be added, and, taking ten years together, that the cost of production will be from 60 to 65 cents per bushel.

Corn is a much more certain crop, is not liable to fall or to rust, suffers but little from insects, and yields double the quantity that wheat will to the acre; yet requires much more labor in its culti-

vation. I will, therefore, put the cost of making corn on good land at 40 cents per bushel, taking ten years together.

Tobacco is a very laborious crop, and its average cost cannot be less than $4 per hundred to the planter.

The last inquiry which you make, "the probable consumption per individual of wheat, &c., Indian corn, potatoes, beef, &c.," I will now proceed to notice.

Indian corn is the chief article of breadstuffs we use in our families. It is food for the master and for the slave; for the horse, the cow, the hog, and for the poultry; and even the wealthiest persons use it at almost every meal. I suppose the quantity used on an estate, including that fed to stock, &c., is from 30 to 35 bushels to every man, woman, and child. But little wheat is used, perhaps not exceeding an average of three bushels for each member of the family, both white and black. Potatoes are only raised for family use. Each family of negroes has its own garden, and raise both sweet and round potatoes without stint or measure. They are very fond of the sweet, but not generally of the round or Irish potato.

Not much beef is used on our estates. The old cattle are fattened and used by the family, and some of the young for early beef; so, also, as it regards mutton and lambs. Bacon, however, is used much more freely, three pounds per week being the usual allowance. The slaves also raise as many fowls as they please, which they eat or sell as they think proper, and all the milk not used by the white family; and as no cheese is made, and few sell butter, the quantity of milk used by the slaves is frequently considerable.

Having replied to most of your queries, permit me to notice a few subjects which I consider of importance to agriculturists; and first, as to the appearance of wheat when in the best state for cutting. Some years ago, I cut several heads of wheat, in what is usually called the dough state; two days afterwards, I cut several more heads, which had turned yellow from one to two inches under the head; and two days afterwards, several more, when the straw was yellow its whole length. After all were thoroughly dry, I weighed each parcel carefully. The first cutting was five per cent. lighter than either of the others, and the two last were of the same weight; the second cutting had much the best appearance. I therefore concluded that, when the straw became yellow under the head, though the remainder was green, that it was in the best state for reaping.

I am aware that in this opinion I differ with many persons, most of whom contend that wheat in the dough state ought to be cut; and an English farmer contended it ought to be cut some 14 or 16 days before it turned yellow, and gave his experiments, which were published in most of the agricultural papers; yet I am satisfied from the experiment which I made, that if cut before the straw turned yellow under the head, the wheat will lose in weight, and if cut as advised by the English farmer, that the whole will be sacrificed.

It is the general opinion that tobacco exhausts land more than

any other crop. Now, I differ entirely from this general opinion, and believe that corn exhausts the soil much more than tobacco.

It is usual for a planter to have his tobacco lots on which he puts all his manure; and the balance of his land is hard worked and hard grazed, and becomes poor. Now, let him change his system, manure his poor land for tobacco, put his old tobacco lots in corn and wheat, and sow clover on his wheat and use plaster freely, and he will make more tobacco, more corn, and more wheat; and his land will improve. It is true, that if you put the same land several years together in tobacco, that the food of that plant will be exhausted and you must manure, and it is the same with corn and wheat; but adopt a rotation of crops, and give the land rest, and it will improve. It is a fact known to all planters, that wheat grows much better after tobacco than after corn—that at least one-third more may be expected after the former than after the latter crop. Is not this proof that corn exhausts the soil more than tobacco? It may be said that the cultivation of tobacco prepares the land better than the corn crop; but both may be worked alike and the same results will follow.

The number of fields or shifts on an estate is also a subject on which great difference of opinion exists—some persons contend for the three field, some for four, some for five, and some for the six field system. Upon high lands, I believe the six field system is the best: first, corn or tobacco; second, wheat or oats, with clover; third, clover; fourth, clover; fifth, wheat; and sixth, clover. The reasons why I prefer this system are, that the land improves faster and you get clear of the cockle and cheat which spring up on a clover fallow of the first year. Upon low grounds I prefer the three field: first, corn or tobacco; second, wheat or oats, with clover; fifth, clover; and under this system the land will improve rapidly, and is too valuable to give more rest.

Respectfully yours,

RICH. G. MORRISS.

BUCKINGHAM COUNTY, VIRGINIA,
November, 1848.

DEAR SIR: Ill health, together with some time necessary to make inquiries and compare opinions with others to aid my limited information, has delayed my responding to the queries in your circular. Accuracy, although very desirable, cannot be expected upon subjects having no fixed data to found correct opinions upon. I, however, with pleasure proceed to give my crude opinions and estimates in reply to the various topics in your circular, endeavoring to approximate probable accuracy.

First as to the probable increase or decrease per centage of the wheat crop this current year, as compared with the crop of 1847.

The crop the present year is greatly superior to any crop made in Virginia for several years past, both in quantity and quality. I estimate fully 33⅓ increase per centage over the crop of 1847, which

you estimate in your last report at 12,000,000; with my estimate, the present year's increase will make 16,000,000 bushels. You request to be informed the cost of growing a bushel of wheat. I reply as follows, making my estimate upon an acre of land, and give you the average bushels and the cost.

To fallowing an acre of land	$0 75
" refallowing, or harrowing, for seeding	62
" seed wheat, five pecks, say at $1 the bushel	1 25
" sowing, double harrowing in seed, and water furrowing..	1 00
" harvesting and threshing	2 00
	$5 62
Yield at ten bushels the acre, cost per bushel	56
	$5 06

I have omitted rent, cleaning and storing wheat, as the offal of tail ends, straw and chaff is more than equivalent. Wheat of late years has become a delicate and uncertain crop, subject to the fly, rust and mildew. To guard against the former, many farmers delay seeding till about the 25th September; no remedy known among us for rust and mildew.

You ask my opinion of your estimated consumption of wheat—three and a half bushels per head, of all free persons? It does seem to me too low, especially in the free States, where but little corn bread is eaten; and in the slave States you allow our negroes none. It is very true, they are fed mainly upon corn bread, which they much prefer; still they enter largely in the consumption of wheat, for most masters supply their slaves with wheat flour at Christmas, Easter, Whitsuntide, when they get married, and in all cases of sickness. Indeed, when great drought prevails, and the corn crop proves short, many farmers consume a large portion of their wheat, rather than buy corn, which, in such seasons, is at a high price.

I also regard your estimate of five bushels corn to each head, white and black, much too low. I respectfully suggest that you extend it to ten bushels to all the slave population; ten bushels of corn, well ground, will make twelve bushels of meal, which gives per head the week little less than a peck; small children will not eat a peck, but what they do not eat they will waste! Negroes are not satisfied with enough, they all require some for waste; besides, they have their poultry and a dog to feed; moreover, a peck per week is not sufficient for a man; I own many that will consume a half bushel a week, having their three regular meals a day.

Your estimated consumption of corn to some domestic animals is greatly below their consumption, to wit: horses, five bushels per head. I verily believe every riding and work horse in this State consumes thirty bushels of corn per head per annum, and less will not sustain a work horse to do good labor. An exception may be made as to a horse of our poorest people, who buy a poor old horse

in the spring, and when winter approaches and the grass dies, why, he dies also; such cattle do not enter into this calculation. Could it be done, I would abstract brood mares and colts from the whole number (5,289,516) horses, as they are mainly kept upon cut oats; corn is considered too rich and heating for colts, renders their legs mealy, and hoofs soft and spungy. Your consumption of corn by hogs is also five bushels per head. I have raised hogs fifty-seven years, and the lowest estimate I ever made was ten bushels per head to raise and fatten, and very often twelve and a half bushels, according to their condition when put up to fat.

The corn crop of 1847 I judge to be the largest ever made in Virginia; more ground was planted—seasons very favorable. I think it probable that there is now remaining nearly enough for another year's consumption. Still, the crop of the present year, which is a very good one, must be rated less, as less was planted, and season not as favorable; I am inclined to rate the decrease at fifteen per cent.

It is now ascertained that the crop of tobacco of 1847 is 15,000 hogsheads less than the crop of 1846.

The season for planting, May and June, in many districts was very dry, which delayed setting out plants till July, consequently a late crop, and not time for the plants to mature before frost.

The potato crop is very good, both long and round; and I hear no complaint of rot in the round potato.

The oat crop is a fair average—say 20 bushels to the acre. It is not a market crop. The best land is seeded in wheat, and the most exhausted in oats.

Rye and barley are not cultivated anywhere in my knowledge. Very few indeed raise buckwheat.

I raise enough for breakfast cakes and to feed poultry. It is a grain too much neglected. Yields well, 30 to 40 bushels per acre, but a great exhaustor of land when harvested. A good, green fallow, when prostrated by a heavy roller, and well turned under with a Livingston plough.

The root crop is not fashionable with us further than for family use.

The turnip, the great crop of England as an improved food for sheep, is very sparsely cultivated, and in this climate is very uncertain from the attacks of the fly before the plants put out the rough leaf. We substitute pumpkins, a richer food, for all our domestic animals, by planting them with our corn every fifth row, and planting thirty feet apart along the row. We obtain them without any extra cultivation, and believe the corn sustains no injury. They can be kept very well if housed before a frost, and packed in layers, with dry wheat straw, in the barn, so that they do not touch one another. I have packed away about forty wagon loads, and have fed them daily, since the 10th of October, to swine for slaughter, milch cows, and work oxen.

I have cultivated this year about the one-fourth of an acre in Mangel Wurtzel. The crop not weighed, but the yield very good,

the roots weighing 10 and 12 pounds. The pumpkin, I think equally nutritious, and the stock rather prefer them.

My knowledge of agricultural societies is very limited, and necessarily so to our reproach, as we have very few in the State. There is, and has been for many years, a very respectable agricultural club at Charlottesville, Albemarle county; but who are the officers, the state of their funds, &c., I cannot inform you. Your address to Colonel Thomas Jefferson Randolph, would obtain the information you desire.

There is the Henrico Club, who hold their sessions in Richmond, and I think General William Richards is the president.

By reference to the Southern Planter, I see a communication to the editor, signed E. H. Herbert, advising that a club was formed in Princess Ann county, at Levelgreen.

I hear of another, called "Hole and Corner." For further information, I refer you to the Hon. Kider Mead. We formerly had a club in this county, from which I anticipated favorable results; but from want of public spirit, and an unfortunate bickering in awarding premiums, it went down. Such subjects, dependent upon individual donations, flourish but for a season. I consider agricultural societies second only to public education, and that it would be a wise policy to establish one by law in every county of this Union, with an adequate capital levied upon the taxable property of the county.

As to the remaining queries in your circular, I must answer negatively, not possessing the information required. Your goodness will pardon my comments upon your estimated consumption of corn and wheat. They are submitted in all due respect and candor, trusting and believing that, under your administration, the Patent Office is now the most valuable public institution in the country. It is all that Congress bestows upon the great agricultural class. I hope they will extend the publication of more copies. It is a document read with more instruction and pleasure, and more sought after, than every other document emanating from that honorable body.

With high consideration, I am, very respectfully, yours,

CHAS. TANEY.

The Hon. Edmund Burke,
Commissioner of Patents.

Sussex Court House, Va.,
November 28, 1848.

Dear Sir: I return you my thanks for the copy of your last report made to Congress, which you were pleased to send me. I have, in compliance with your request, taken some little trouble upon myself this year, in order to ascertain, as near as I could, the amount of the different crops raised in the county of Sussex in 1848; though the period at which you reqiure the several reports to be made to your department is too early to ascertain with exact

certainty, (as by the first of December few farmers have housed their corn, gotten out their entire crop of wheat and oats, picked out their cotton, or killed their pork,) I have, therefore, had to rely upon something like guess work, assisted by those to whom I have applied; and I am pretty certain that, if I have erred in my statistics, I have erred on the safe side. I have taken for my basis school district No. 3, in which I reside.

The county of Sussex is said to contain 592 square miles, and is laid off into nineteen school districts, which gives to each district 19,941 acres of land; one-fourth of which I will say is in cultivation of the different crops annually.

The third school district contains thirty families, though there are several of them who cultivate most of their crops out of the district; and there are also included in the number five families of free negroes, who make but little of any kind of crops. These thirty farmers in 1848 made 4,113 barrels Indian corn, 1,326 bushels wheat, 4,800 bushels oats, 177,800 pounds seed cotton, 1,050 bushels peas, 653 gallons apple brandy, 83,600 pounds pork. I have said nothing about root crops, blade and top fodder, straw, &c., which is very considerable.

There are two farmers' or agricultural clubs in this county, namely, The Hole and Coon's Club No. 1; formed in June, 1847, Benj. W. Belschis, president, Victor M. Eppes, secretary; post office address, Hawkinsville, Sussex county; twelve members; no premiums as yet paid. I am informed that, though this club is yet in its infancy, much good has been effected in its vicinity. The South Side Club, formed in June, 1848; William Thornton, president, John T. J. Mason, secretary; post office, Sussex Court House; ten members. This club has been too recently formed to judge of its effects. I have no doubt, if these clubs were formed in the true agricultural spirit, and were conducted upon that principle, that they would be productive of much good in stimulating the farmer to greater exertions in the improvement and cultivation of his farm.

Slave labor is altogether used in the cultivation of our farms, and they are hired by the year; and the average price per year for male hands is about $60; for females and boys, from $25 to $30. The wages of mechanics are from 50 cents to $1 25 per day. The price of transportation to market about 25 cents per 100 pounds.

Our lands are generally poor and very much worn, though they are susceptible of great improvement, and many of the farmers have turned their attention to improving their lands with marl, lime, guano, and other manures. But we are too extravagant; and as long as pride, fashion, and extravagance prevails amongst us, we are destined to be a poor people.

To give you some idea of our economy, the county of Sussex pays a revenue tax of about $3,300, and the assessed value of pleasure carriages in the county the present year amounts to upwards of $35,000. But I do not complain.

With much respect, your obedient servant,

JESSE HARGRAVE.

I annex the following table:

	Number of bushs., lbs. &c., raised in the third school dis	Number of bushs., lbs. &c., raised in the Co. of Sussex in 1848.		
Indian corn	20,565	390,735	at 50 cents per bush.	$195,367 00
Wheat	1,326	25,194	at $1 per bushel	25,194 00
Oats	4,800	91,200	at 30 cents per bush.	27,360 00
Peas	1,050	19,950	at 50 cents per bush.	9,975 00
Seed cotton	177,800	3,378,200	at $1\frac{1}{4}$ cents per lb	42,227 50
Brandy	653	12,407	at 35 cents per gal	4,442 45
Pork	83,600	1,588,400	at 5 cents per lb	79,420 00
				$383,985 95

JESSE HARGRAVE.

Hon. Edmund Burke.

Sussex County, Va.,
December 1, 1848.

Dear Sir: Since I forwarded to you my report of the 28th ultimo, I find that I failed to state the number of hogs and sheep in the third school district, which are as follows: Hogs, 1,265; sheep, 166. I also am inclined to think that as cotton is now selling, I should have stated the price at $1\frac{1}{2}$ cents instead of $1\frac{1}{4}$ cents per pound.

I have some excellent kind of corn and tomato seed, if I knew of any means of sending them to you.

Very respectfully, your obedient servant,

JESSE HARGRAVE.

Hon. Edmund Burke.

	No. of hogs and sheep in 3d school district.	No. in the county of Sussex.
Hogs	1,265 × 19 =	24,035
Sheep	166 × 19 =	3,154

P. S. If you think proper, you may add this to the table in my first.

J. H.

Bethany, Va., *February* 2, 1849.

Dear Sir: The principal crop of this region, *wheat*, has been unusually abundant the past season, and of superior quality. I

have obtained from owners of threshing machines the amount threshed in this neighborhood, over an area three miles wide and five miles long, containing, of course, 15 square miles. I find this amount to be in round numbers 17,000 bushels = 1,133⅓ bushels per square mile. The remaining portion of the county will have yielded less wheat in proportion; but I think the average will not be less than 800 bushels. We have now 82 square miles in this county, and, at the above estimate, the production of the wheat will be 65,600 bushels.

From the census of 1840, and the best judgment I can form of the present number of inhabitants, I would put this number down at 50 to the square mile = 4,100 in the whole county. From careful estimates based upon observed facts, I should set down as the annual consumption of each inhabitant 4½ bushels. This will give 18,450 bushels as the amount used for food. If to this we add 2,200 bushels as the amount used for seed, we shall have 20,650 bushels, which, taken from the entire product, 65,600, will leave 44,950 bushels for exportation.

The above estimates will apply without material alteration to the contiguous portion of Ohio county, embracing, say, 100 square miles. For the counties west and south of this district, a large reduction, probably one-half, must be made in the estimate of the product of wheat. The estimate of 4½ bushels of wheat, or one barrel of flour, as the annual consumption of each inhabitant, will by no means apply to the southern part of this State; neither will it apply to Kentucky; nor, indeed, to any of those States in which *Indian corn* forms the chief *breadstuff*. In this region, wheat being the principal grain crop, wheat bread is almost exclusively used; and I am certain that the consumption is not less than 4½ bushels of wheat to each individual.

Potatoes have never been very largely cultivated in this quarter, and are much less so at present, owing to the uncertainty of the crop. This also adds to the consumption of wheat. The early potatoes last season were unusually fine, the late ones inferior, and prone to rot in the ground. Such as were left, however, by the disease, appear to keep well thus far.

The disease appears to be as yet a mystery, nor has any remedy yet been discovered, unless it be found in the plan lately recommended in Germany—*to stop the exuberant growth of the stem by cutting off occasionally an inch or so of its extremity.*

A very large amount of Indian corn is produced *in this quarter;** *but it is all consumed at home*, in feeding hogs, sheep, horses, and *cattle*, in our restricted *American* use of this word. I should estimate the cost of raising Indian corn here at 20 cents per bushel, and that of wheat at 62 cents.

The spring, summer, and autumn of 1848, were in this region remarkably cool and showery. The showers, though frequent, were light, and the amount of rain has not been much above the

* 135,246, in 1840, as per census in Brooke county.

average quantity, I think, of former years. Pasturage and meadows were unusually fine; but much hay was injured by the rains. During wheat harvest the weather was more favorable, and this crop was secured in good order. The weather here during the winter thus far has been exceeding variable, unseasonable, warm, and rainy; but little snow, much freezing and thawing, so that the wheat now in the ground has been already much injured.

The crops during last season were unusually free from insects, blight, and rust.

The number of horses in this county, as I have ascertained from the books of the commissioner of the county, is 1,182.

There is a large number of cattle in the county; but I have no means of determining it.

We have here also an immense number of sheep. The number reported in 1840, was 33,948. Since this time the county has been divided; but within the same limits the number, I presume, is now not less than 50,000. This region has the credit of furnishing the finest wool in the United States.

We have an agricultural society here called the "Brooke and Ohio County Agricultural Society." It is small, and its resources limited. It meets annually at West Liberty, and distributes prizes to the amount, probably, of $50. The president is Samuel Mitchel, and the office of corresponding secretary was committed to me. This society was formed in September, 1841. We should be happy to receive any seeds, plants, or books, for distribution, from the office over which you preside.

With much respect, I remain yours, &c.,

R. RICHARDSON.

Hon. Edmund Burke.

Chucketuck, Nansemond County, Virginia.

The "Circular of Inquiries" sent out from the Patent Office for 1848 having been placed in my hands by James H. Godwin, esq , to whom it was addressed, for reply, I submit, after due inquiry and reflection, the following replies and observations, which are designed to have reference more especially to that part of Nansemond county, Virginia, which lies on, and in the vicinity of, Nansemond river and its tributary streams; although they are believed to be applicable to most of the adjacent counties which border on the navigable streams which abound in lower Virginia.

Wheat.—Not so good a crop as in 1847 by ten or fifteen per cent.; injured somewhat by rust; time of seeding, last of October and in all November; average bushels of seed per acre, $1\frac{1}{4}$ bushel; kinds most successfully raised, purple straw and Mediterranean; best soil, limed and improved; average per cent. consumed where raised, nearly the entire crop sent to market, there being no manufacturing mills in our vicinity; price one dollar per bushel.

This crop is not generally cultivated in this county, the soil not being so well adapted to it. Improved and limed, or marled land

however, produces good crops, and its cultivation is on the increase; ten or twelve bushels the average product per acre.

Oats.—Time of sowing, 20th February to 20th March; seed per acre, 1½ bushel; time of harvest, 10th or 15th July; average bushels raised, ten or twelve bushels per acre; amount consumed where raised, eighty or ninety per cent.; price 33⅓ cents. This crop more generally cultivated than wheat, for which our light sandy lands are better adapted; crop not so good as in 1847, by probably fifteen or twenty per cent.

Indian corn.—The main and staple product of the county; time of planting, 1st to the 30th of April; average product per acre, fifteen bushels; time of gathering, November; price 55 cents; kinds most successful, large white and large eared yellow; average per cent. consumed where raised, sixty per cent. This crop is very good this year, better than in 1847, in some soils.

Sweet potatoes.—This crop has yielded well this year, better than in 1847 by fifty per cent., and has been sold readily at good prices. Time of planting, 10th to 30th April; seed per acre, five bushels; time of digging, 1st September to 1st November; average bushels raised per acre, 100 bushels. The quantity raised per acre would be much larger, but for the *early* digging to supply the demand for northern markets. Kinds most successfully raised, the yellow bark, this variety being the only saleable one—the *Spanish* is most preferred for home consumption; about ten per cent. of the crop consumed at home; price 40 cents.

The sweet potatoe is largely cultivated near our navigable waters, and constitutes the most profitable crop raised with us. During the months of September and October, large quantities are purchased at our landings by northern traders, and taken to all the accessible markets on the coast, from Baltimore to Boston. Experience, so far, has taught that the supply cannot be made to exceed the demand. Nature has so defined and circumscribed the soil and climate where this crop can be successfully raised, *and at the same time be accessible* to the northern markets, as to secure to tide water Virginia a monopoly of this crop for those markets. The railroad and other facilities for transportation, which penetrate the northern States, enable purchasers to supply all the interior villages and towns, and hence the continual increase of consumption and demand for this crop.

Irish potatoe.—Beginning by many to be cultivated as an *early* crop for the northern markets. They can be raised several weeks earlier with us than in Maryland and New York; but when dug so early, the product is not large; and requiring, as it does, large quantities of rich manure to insure an early crop, it is doubtful whether its cultivation as an early crop will be extensively resorted to. Time of planting, February and March, for an early crop. Average product per acre, if dug in June, 35 or 40 bushels; if in October, 80 bushels. Seed per acre, 10 bushels. Price in June, 80 cents to $1; in October, 37½ to 50 cents. Kinds most success-

ful, Mercer. Average per cent. consumed where raised, 75 per cent.

Cornstalk fodder.—It is the custom of the county to strip the blades from the cornstalks as they stand in the field as soon as it can be done without injury to the grain. These blades are cured in the sun, and tied, with blades of fodder, into bundles of 1 lb. each. Average product per acre 180 lbs., or 60 lbs. to the barrel of corn. The fodder, thus made, with oats in the straw, constitutes the chief food for stock as hay. A hand cannot save on an average more than 150 lbs. of blade fodder a day.

Probable proportion of cultivated to uncultivated land.—One-third of the land may be set down as in cultivation. The quantity, however, is believed to be diminishing annually, because the number of laborers is diminishing, large numbers being annually sold away to the sugar and cotton-growing States, and because increased attention is being paid to improvement of land, it being preferable to cultivate a smaller quantity of *improved* to a larger of poor and unproductive land.

Peas.—The field pea, black-eye of several varieties, and *red* and *black*, is extensively cultivated among the growing corn and in separate fields. Sown broadcast when the corn is laid by, or in fields to itself, it forms a luxuriant and abundant growth of vine, and produces a good crop of peas. Thus cultivated, and turned under with the plough, or suffered to decay on the surface, it becomes a great improver of the soil, forms an excellent preparatory crop for wheat, or oats, or *potatoes.* It is especially suited to our shelly and highly marled lands, which need continual supplies of vegetable matter to render them productive. Time of planting, all the month of June. Seed per acre, 1 bushel per acre for *planting* or *sowing.* Time of harvest, September and October. Product per acre, among corn, 8 or 10 bushels; when planted separately, 15 or 20 bushels. Price for black-eye, 55 to 60 cents; for red and black, 40 cents.

Beef and mutton.—Very little raised for market. Price 4 or 5 cents per lb.

Pork.—Not more than enough raised to supply the home demand.

Hogs.—It is the custom of the county to allow each working hand from 4 to 5 lbs. of good pork, or $3\frac{1}{2}$ to 4 lbs. of good bacon weekly, or to substitute, in part, equal portions of molasses or fish. This makes 200 lbs. to the working hand.

The average consumption in each family, at least 150 lbs. for every member of it.

I have no means of ascertaining the quantity of rain which fell during the past year. It may be remarked, however, that we have had a less quantity this than on several preceding years, although what we have had came opportunely, in light showers, and in quantities sufficient to secure good and abundant crops. It may gratify the curiosity of some to know *how many times* it has rained this year. I therefore subjoin a statement which may be relied upon as correct:

It rained in January, 4 times; in February, 4 times; in March, 4 times; in April, 7 times; in June, 4 times; in July, 10 times—the wettest month in the year; in August, 6 times; in September, 6 times; in October, 8 times.

Orchards.—Some increased attention is being paid to raising early varieties of apples for sale to northern markets, which sell readily here at our landings, when green and not more than two-thirds grown, for 25 to 50 cents per bushel, and are taken to Philadelphia, New York, &c.,

Manures.—The attention to the raising and application of manures is greatly on the increase. Marl, which is abundant in most parts of the county, has been very extensively used. The greatest objection to its use is the overwhelming growth of wire grass which invariably follows its application, and which more than doubles the expense of cultivating the land where it exists.

Most approved rotation of crops.—Nothing so materially interferes with and prevents the adoption of any regular rotation of crops as the abundant growth of wire grass just mentioned. Cultivate a field in corn, sow it in oats and clover, and let it remain one year in clover, grazing it meanwhile, and it becomes a continuous mass of matted roots, requiring the full strength of two or three large horses to break it up, and increasing for the whole year at least 100 per cent. the expense of cultivating it.

Oysters.—Large quantities of oysters are removed from their natural beds in the river and bay to the flats and other suitable localities on the river and creeks; and after being thus *planted*, or *stalled* as we term it, for one or more years, are taken up and sold for northern and distant markets. Price 40 to 50 cents per bushel.

Pine wood.—An immense quantity of pine wood is continually being taken from the shores of tide-water Virginia to northern markets, as far north as Providence. It sells readily at the landings for $2 per cord.

Wages of labor.—Agricultural laborers can be had for $60 to $70 per year in money, and their *board* and *clothing* found by the person who hires them, making them cost $100 or $110 annually. They can be had by the day for 40 cents and found. Mechanics, 75 cents to $1 per day and found. Female domestics, $20 or $30 per annum, clothing and board found.

Price of transportation to market.—In this respect, we enjoy singular advantages. Corn and wheat 3 to 4 cents per bushel to Norfolk, and 6 to 8 cents to Richmond, Baltimore, New York, &c. Other articles in proportion.

There is not an agricultural club or society in the county.

The articles or productions in your "circular," which I omit to notice, are not cultivated with us, or, if at all, to no considerable extent.

If you can make available for any useful purpose anything in the above report, my object will be accomplished.

Respectfully, &c.,

C. FINNEY, *M. D.*

Hon. Edmund Burke.

DUNLAPVILLE, S. C., *December* 1, 1848.

SIR: Inside I have endeavored to fill out the blanks as well as my information would permit. What is said is intended to apply only to the granite regions of South Carolina, extending from the first water falls to the mountains. To be more full than the blank space in your circular will permit on some subjects, I will add the following remarks: This season most of our crops have been injured by droughts, commencing with July and running through summer. Until July we were favored with very seasonable rains, and our crops were promising. In the latter part of August, during fodder and pulling time, we had one wet week, after which we were dry until the middle of November. The drought, I believe, was general; but some locations suffered less than others.

The wheat crop was winter killed, hurt by the fly and somewhat by the rust, and was below an average—say 10 or 15 per cent., perhaps more. It is not, however, a principal crop with us. A surplus—perhaps one-third—is sent to market.

Oats, owing to the seasonable spring, were very good; above an average, and perhaps 15 per cent. better than last year, when they were also good. Here they are more sown than wheat. They are mostly consumed on the farms.

Indian corn is our principal crop; most of it is planted in March, and goes through the process of curing in July, and was, consequently, much injured by the drought. I think it is one-third less than last year's crop. On the creek bottoms it was good; on the ridges very inferior. The large remnant of last year's crop on hand, and the fine oat crop of this year will probably prevent any deficiency. But little of it is ever sent to a distant market.

The cotton crop is, I think, near an average, and perhaps 10 or 12 per cent. better than last year. It was also injured by the drought, but not as much as corn; it stands drought better. Last year it was injured by too much rain. During the picking season we had very favorable weather, and but little was lost from winds or other casualties. It is needless to say it is our principal marketable crop, and that present low prices are not remunerative. Our region, however, produces all the cereals abundantly, and has unrivalled water facilities for moving machinery; and I have no doubt that in a short time a more proper diversity of employment will take the place of the present too exclusive attention to cotton, and that our favored region will again be prosperous. Already there is a much increased attention to raising stock. We now buy few mules, fewer horses, and but little pork; and what, perhaps, is more encouraging than all, we are more earnestly engaged than ever before in improving our lands by manures and other means.

Very respectfully, yours,

JOHN H. DAVIS.

HON. EDMUND BURKE.

CHARLESTON, S. C., *November* 21, 1848.

DEAR SIR: The accompanying circular was received by me some time in the course of last summer, and I now return it with such answers to your questions as I have it in my power to make.

Those contained on your first page I must answer here.

1. Black Oak Agricultural Society—president, Samuel Dubose; secretary, H. W. Ravenel; post office, Black Oak, S. C.

2. Sixty-four members; annual contribution $3 per annum; seventeen premiums for which silver medals are offered.

4.—*April.*

Maximum of thermometer	87°	on the 12th day.
Minimum " "	39°	" 21st "
Range " "	48°.	
Range of barometer	79°.	
Rain in inches	0.73.	

REMARKS.—Mild and favorable to the germination of crops; rather cool about the 21st; (Fahrenheit's thermometer used; kept against the north side of a house protected by a piazza, and uninfluenced by direct radiation.)

May.

Maximum of thermometer	91°	on the 7th day.
Minimum " "	47°	" 13th "
Range " "	44°.	
Range of barometer	42°.	
Rain in inches	5.85.	

REMARKS.—Favorable to growing crops; rather wet towards the end of the month.

June.

Maximum of thermometer	86°	on the 21st day.
Minimum " "	58°	" 2d "
Range " "	28°.	
Range of barometer	22°.	
Rain in inches	2.58.	

July.

Maximum of thermometer	86°	on several days.
Minimum " "	70°	" "
Range " "	16°.	
Range of barometer	38°.	
Rain in inches	5.16.	

REMARKS.—Too cloudy and wet for cotton crops, causing the bolls to drop.

August.

Maximum of thermometer............... 86° on several days.
Minimum " " .... 66° on 2d.
Range " " .... 20°.
Range of barometer.................... 34°.
Rain in inches......................... 1.95.

Remarks.—No rain after the 14th, with clear warm weather, favorable to cotton crops.

September.

Maximum of thermometer............... 92° on the 1st day.
Minimum " " .... 51° " 23d "
Range " " .... 41°.
Range of barometer.................... 40°.
Rain in inches......................... 0.42.

Remarks.—A dry month, and in the early part very hot; not unfavorable to cotton crops, but injuring the sweet potato and cow-pea crops.

October.

Maximum of thermometer............... 80° on the 10th day.
Minimum " " .... 42° " 21st "
Range " " .... 38°.
Range of barometer.................... 52°.
Rain in inches......................... 3.56.

Remarks.—The drought continuing until the middle of this month; on the whole, favorable to the harvest.

5. No blight or insects.

Very respectfully,

H. W. RAVENEL.

Mound Farm, Georgia,
November 28, 1848.

Dear Sir: I have delayed my communication to the Patent Office until after the State agricultural fair, which came off three days ago, hoping to be able to give you some useful information gathered there. In that I entirely failed. I believe there were some delegates from the whole State; they met at Sparta, Hancock county, with the Hancock Agricultural Club, and but for that, there would have been no organization; and, if there were any returns from county societies, I was not so fortunate as to procure them; so you must excuse my meagre report.

The governor is for the time being the president of the State Society, at Milledgeville, and D. W. Lines, at Sparta, is secretary; Thomas Turner is president of the Hancock Club, at Sparta, and Tuttle H. Andis, secretary, also at Sparta.

This has been a remarkably favorable season for planting; the winter mild—March, and April also—in the gentle seasons, a little too dry; May, June, and July, gentle showers, and generally enough; August and September, too dry for exhausted land in cotton, though favorable for land in good heart; and since that, gentle, regular seasons, and healthy all the year.

In relation to the cost of our various products, it is difficult to make an accurate estimate. We work our own hands, of all sizes, ages, and sexes, that are fit for the field. Our plantation is a little colony, where blacksmiths, carpenters, tailors, shoemakers, and butchers, are all carrying on their trades for the use of the colony; all have to be provided for and maintained, and the provisions are generally made by the hands in a way that it is difficult to separate one thing from the whole.

Then the legislative, executive and judicial functions of the colony must be furnished (sometimes paid for) and supported, and cotton being the only product for market, and varying so much in price, it makes it very difficult to collect the data for correct calculations on the price of producing. At the present price of land and slaves, on a well managed farm, I think cotton can be produced at 7 cents per pound; corn at 30, oats at 25, and wheat at 60 cents per bushel, and the capital invested made to yield 7 per cent. increase; but in this estimate the natural increase of the slave stock, &c., in the growth of an establishment, as well as the support and education of the owner's family, are counted. So you see that precise accuracy is difficult to arrive at, and various opinions are formed of our property.

On our farms, we generally allow 180 pounds of pork, 50 pounds of beef, and 15 bushels of corn, for each individual, little and big, to consume in the year; besides, milk, vegetables, and some molasses, flour, sugar and coffee, amount not estimated; and, in addition to that, sweet potatoes and fruits, almost at will, for two-thirds of the year.

For this year, wheat, I think, did not yield over one half an average crop. The cause in most cases was from the injury of the fly, or a small worm in the roots and stalks of the plant. It commenced early in the winter, and continued its ravages until the wheat was headed out; the yield not over four bushels per acre. We sow in October and November about three-quarters of a bushel per acre, and harvest about the first of June, and expect it to yield eight or ten bushels per acre. The early varieties are the surest crop, on account of the rust; though they do not yield so well, or make as fine flour, as the winter wheat when it matures well. We are increasing our wheat crops.

Barley but little raised, and that for seed and feeding off green.

Oats are an important hay crop with us this year, and produced about an average yield; we sow, in January and February, about one bushel per acre, and cut in July, and expect a yield of twelve or fifteen bushels per acre.

Rye.—An uncertain crop, from the rust; sown in the fall, a half

bushel per acre, and harvest in June or July, and expect six or eight bushels per acre.

You will discover our grain crops are thrown on the ground; the blade grows large, and if we crowd the plants, as is done further north, it fires, and does not produce fruit.

Buckwheat.—None sown.

Indian corn, our great grain crop, has this year yielded finely, from the favorable season throughout, particularly June and July, the months to mature the corn crop. We plant in March, generally, in drills, and gather in October, and expect an average yield of fifteen or twenty bushels per acre, though our best ridge land will yield thirty bushels per acre, without manure; and alluvions, below fertile uplands, will yield fifty or sixty bushels per acre before they are exhausted.

By cultivation, here, the common or Irish potato can only be raised successfully as a spring crop. We plant in February, and have them on our tables by the first of May, though it is difficult to keep them either from germinating or rotting through the summer and fall; consequently, we generally purchase for seed. Through May, June and July we can raise them plentifully for any uses; after that the sweet potato takes their place on our tables; this year a good crop.

The sweet potato is grown as a field crop for stock, as well as for the table. We plant in March, and gather in October; this year a good yield—no distemper.

The cotton crop may be put down at ten per cent. over a fair average, and 200 pounds of lint as the average yield per acre. The cotton opened early, and the fall has been favorable for picking; consequently, the gathered crop will be over an average. The small crops and large crops are always under and over estimated, when examined in the field. We can only gather so much, and do justice to our stock, provision crops, and farms; and, at the picking season, no hands are to hire. When the crop is light, we gather it all, and in good time—the product is over the estimate. When the yield is over a certain amount, we cannot gather it—it is wasted, and left on the field, and the product falls below the estimate.

Hay, hemp, flax, tobacco, rice, sugar, and silk, all can be grown here, and some of them profitably; but our slaves being deficient in forethought and contrivance, we diversify and change our pursuits as little as the market will admit of, and those products will be but little attended to until we are drawn from cotton.

The blades of our corn, after the ear glaves, are stripped off and dried for fodder. This is our principal hay crop, and, I suppose, every 100 bushels of corn yields 1,800 pounds of fodder; very little green corn is grown here for hay.

The turnip is cultivated here as a field crop for stock, as well as for cooking, and is certainly a great addition to our agriculture. We leave them in the ground until wanted, and they continue to grow in warm weather through the winter. All the varieties are grown and do well; we sow in August. This year a good crop,

where we got a stand, which was difficult on account of a dry August. With the exception of the potato and the turnip, but few roots are grown out of the vegetable garden.

Few beans are grown out of the garden; but we plant peas in all our corn crop. Sometime in the month of May, the last ploughing but one, we drop the seed between each corn row, seven or eight together, every three or four feet, and afterwards give them one ploughing and one harrowing. Of a good season, they will yield some six or eight bushels per acre, in addition to the corn, and serve to fatten our stock after we have gathered the corn, and what peas we want; and the little left on the ground is thought to be peculiarly fertilizing; probably, the pea vine is the most economical fertilizer we can use for our lands. The most of our bacon is fattened in our pea fields.

Fruits and berries have done well this year.

I think some increased attention is being paid to stock and stock products, particularly butter; though in that we are wofully deficient. To think one million is expended annually in Georgia for stock and provisions that we can raise as cheap, or nearly so, as where they are brought from, and cotton hawked in the market, at four or five cents, to raise the money! For the details in prices, weights, &c., I will refer you to my last year's report.

Mules and pork are twenty per cent. lower.

Wages of labor for farm managers or overseers are $300; on small farms, $200; and from that price to four hundred dollars, in proportion to the number of hands and skill of the manager. White mechanics, $1 to $1 50 per day; black mechanics, 60 cents to $1 per day; farm hands, (all black,) men, $5 per month—females, $4 per month; female domestics, (some white,) $4 to $4 50 per month.

For *prices of transportation* to market see railroad prices, as almost every farmer hauls his produce to the roads.

Respectfully,

J. L. WHITTEN.

To the Hon. Edmund Burke.

Carrolton, Carrol Co., Ga.,
November 22, 1848.

Sir: At your request, I herewith transmit a few answers to the interrogatories forwarded me sometime since. You will readily perceive that my reply is limited to but very few of the many questions asked me, owing to the total inattention of our farmers to the culture of many of the articles contained in your circular. This inattention is attributable, in a great degree, to the large quantity of gold that has been found in this county, from its earliest settlement to the present time, estimated at twenty thousand dollars per month for a number years past. This has diverted the attention of the people from agricultural pursuits, it being much more tempting, and much more easy to extract from the bowels of the earth the precious metal in a pure state, than to undergo the

tedium of clearing, planting, gathering, selling, &c. It has, in every gold region, had a corrupting influence destructive to the morals and industrial habits of the people.

Until within the last two years, very little attention has been given in this county to the culture of cotton, owing not only to the cause above stated, but to the great distance we have heretofore been situated from market; which last and principal obstacle is now removed by the Western and Atlantic and Georgia railroad bringing a market within fifty miles of our court-house. The crop is much larger this than last year, and I have no doubt it will continue to increase until as much is raised in this county as in the older cotton planting counties.

The present crop of Indian corn, wheat, and oats is much larger this than any previous year, owing not only to a larger amount being seeded, but to an increased interest being manifested in agricultural pursuits generally. Our crops of wheat especially, for the last few years, have been good, and not so uncertain and precarious as formerly. I think I might safely say that our soil is better adapted to the culture of this article than many of the counties around us.

The sweet potatoe is raised to a considerable extent here, but is principally consumed on the table and by stock. They grow large and fine, and are not subject to many of the maladies that prove so destructive to this root in other sections.

It is worthy of remark that, while the people of this county have almost entirely neglected every thing pertaining to agriculture, except only what was necessary for a support, such good attention has been given to apple orchards. In passing over this county, it is not uncommon to see fine large orchards of well selected apples, which rarely ever fail to produce abundant crops, owing to the elevated situation of the county.

Little attention is given by our farmers to clover, grass, &c., depending for provender entirely upon fodder gathered from the corn, which frequently proves very injurious to horses, owing to the bad condition in which it is put up.

I regret, exceedingly, that I am unable to give you a better report of the state of agriculture in this county, but content myself by saying that the interest taken in this great and important pursuit is manifestly growing; and I trust we shall soon be able to give a better account of ourselves.

Respectfully, your obedient servant,

E. B. MARTIN.

Hon. Edmund Burre,
Commissioner of Patents.

Barbour County, Alabama,
October 25, 1848.

Dear Sir: Accompanying this report will be sent the "circular of the Patent Office Department," filled out, which has been

gathered from such sources as deserve respect and confidence, as well as from personal observation on my own part, and I trust that it may meet your approval and official purposes.

My report of 1847, for your department, covers a general view of the agricultural condition of this immediate section of Alabama. The period of one year just passed has produced no change worth noticing or reporting. Hence, I shall merely add the present crop, as compared with that of 1847, without reference to particulars, &c., as regards cultivation and general management.

Small grains are on the increase. Wheat, rye, and oats, turned out well, the yield fully sustaining the figures set down in the circular.

Corn.—The spring was unusually forward and favorable. This crop was put into the ground early, and the land in fine order to receive it, being warm and dry, (in 1847 very cold and wet.) Stands were readily procured, the stalks grew off rapidly, and seasons throughout favorable, which resulted in a heavy yield, full three weeks earlier than the crop of 1847, and at least ten per cent. greater in the quantity made. From all quarters do we hear that the corn crop is a full one. The wants of the county are more than supplied; what will be sold will rate low.

Cotton.—The crop is not a full one, having been injured by the boll worm and rust, the early season being favorable up to the 25th of July. The weed grew off rapidly, and the bottom crop was a full one; the middle and top fruiting were seriously injured by the disasters above named. But, notwithstanding, there will be more cotton made the present year in this county than the previous year. In relation to the crop of this State, the accounts are very conflicting, and as yet no satisfactory results can be obtained. In my opinion, the whole crop of the cotton-growing States will not turn out more in quantity than the crop of 1847; for Texas, Louisiana, Mississippi, and Georgia, complained of no disasters last year, while the present we have observed, in the papers from all quarters, complaints of the boll worm and rust. A general disaster, no matter how small, will produce results far different than when only partial. In 1847, South Alabama was more infested with disasters than anywhere else, while in the States above mentioned a regular favorable season was experienced throughout, and heavy crops made. Still this opinion amounts to nothing, as the impression now is that 2,600,000 bales will be the crop of 1848; as such, we must wait the returns as made out at the shipping ports. But be it 2,000,000 or 2,600,000, the prospects are gloomy and disheartening to the cotton planters; from all sources we learn that prices will range very low.

Stock.—A large portion of the planters in South Alabama heretofore have been dependent on Tennessee for their pork. Whilst cotton sold high this department of our domestic policy was entirely overlooked, believing then that it was more profitable to grow large crops of cotton than to devote more land to corn and pasturage, for the purpose of raising hogs. In a word, it was con-

sidered cheaper to buy than to raise pork. Such a system might then be considered politic; but since the fall of cotton to 6 cents, and pork rating high, it was at once manifested who was the most fortunate—the buyer or the seller. Millions of dollars have thus been carried from the cotton States, owing entirely to our own mismanagement and negligence, and at the same time impoverishing us by the over production of cotton, and their dependence on a market for the meat necessary for plantation purposes. For the last two years a different policy is being pursued. The low price of cotton has clearly shown that the planter must depend more on the resources of his own farm than on markets for his supplies. This has caused much attention to the raising of hogs; and we are now carefully seeing to this valuable stock, and fast producing the number requisite for our own wants. As such, the increase of hogs has been surprisingly great; and we now hear the planters boasting of their pigs, as much as it once was customary to boast of their cotton fields. In all new countries we generally find that domestic economy is very much lost sight of, from *peculiar and necessary circumstances;* a market crop is urgent, which causes this negligence in home supplies being more cared for; hence this dependence on other section of countries, particularly for pork. The age of this country is now undergoing this change—passing from the habits of a new country to that of an older; and with it the farming system is being adopted in the stead of the planting. The results will be, that less cotton will be raised in future, and more provisions of all kinds. When this shall have been thoroughly effected, more contentment and happiness will be depicted on all hands, and we shall then witness the permanency and comforts springing up in all quarters in regard to residences and plantation fixtures—churches and schools—that so loudly bespeak the prosperity and happiness of a contented population.

JNO. H. DENT.

Hon. Edmund Burke,
Commissioner of Patents.

Edwards, Hinds County, Miss.,
November 6, 1848.

Honorable Sir: In reply to your circular, I beg leave to be indulged in making up a report in the manner as follows; and when I dare to suggest alterations in your report, believe me, sir, as actuated by the warmest personal considerations for yourself, a deep sense of gratitude for the selection of myself as one to reply, and with an exalted opinion of the usefulness of your report.

I know your labors must be of an herculean order; and I believe, considering all things, that your statistics are very good.

That your report is prized I know; for I could distribute, even among my acquaintance, hundreds of copies.

As an agricultural work I feel proud of it, and I humbly hope to

be of some little aid in giving hints that may suggest to your mind a more perfect work.

The population of Mississippi you estimate at 640,000, a gain on 1840 of 265,000. I should not place it over 500,000, as the immigration here has not been great for the last eight years.

The cotton crop of Mississippi you place at 250,000,000 lbs., or 625,000 bales; that of the United States at 1,041,000,000 lbs., or 2,600,000 bales. Last year I placed the crop at 2,200,000 bales, and that of New Orleans at 1,150,000 bales.

The extraordinary fine weather and a late killing frost (2d November) made the crop yield to exceed my expectations; but it only reached, say 2,300,000 in all, and about 1,220,000 in New Orleans. My impression was that Mississippi would make one-half of what was sent to New Orleans, but I did not think the New Orleans crop would go so high.

Mississippi is the largest cotton growing State, but she will fall short of the best crop, and I place my figures now for the United States at 2,300,000 bales, and that of Mississippi at 525,000. In 1845, the census of Mississippi gave 213,000 slaves. Of these, 40,000 were under five years of age, leaving 173,730 over five; deduct from these 53,730 as too young and too old to work as house servants, &c., and add only 10,000 whites who labor at cotton, it will give 130,000 employed in cotton planting. At an average of 4 bales, we will have 520,000 bales. I think the crop of Mississippi may have exceeded this last year; but the unfavorable season for cotton, though very fine for gathering, with an early killing frost, (November 2,) must reduce the crop; and I would not be surprised if the receipts at New Orleans fell under that of last year by 100,000 bales. The effect on the low grounds has yet to be seen before we can form a fair opinion.

In your report you allude to Mastodon cotton as promising something. I regret to say that you was mistaken, and that, like other bubbles, it burst. It never would have done more than excite some attention in this country had it not been for the press. The introducer of that seed puffed them so much that many were deceived. After trying them one season I put them down as unfit, and so worded a report to a public journal. The editor thought me wrong, and would not publish. I tried them again, and was induced to send a few seed to Carolina, from the favorable reports made to me by upland planters. Again I experienced the same thing, and threw the seed into the manure pile. At present they are not planted.

There are other seeds on trial, and been used two to four years. So far they hold to all the introducers promised. I allude to "Sugar loaf," "Vick's 100-seed," and "Hogan's seed." The first is the earliest maturing, and easier to pick of any I have ever tried, yielding as well per cwt. of lint (and better from the field) as the best Pettit Gulph. The bolls are rounder, and thinner hull than any other variety; bolls growing on sides of stalk, limbs, in clusters of two and three or more. Vick's 100-seed is the result of the most patient, persevering, and scientific selection from the field,

and a judicious selection in the house as to staple. It is Mexican, orPettit Gulph highest improved. The production is better than Mexican, fair yield of lint, better in maturing and picking qualities. The Hogan exceeds all in productiveness and yield of lint. I have not planted it, but visited the largest patches of it; grown within a few miles of me for two years, and holds its own. I may be deceived, but I am willing to risk a trial. There is no deception in yield or quantity of lint thus far; but it may fail, as others have done.

There is no mistake in saying, whenever a half-acre or more has been planted, the yield has been over 50 per cent. None who plant it come down that low, nearly every one say 100 per cent. or over.

The yield is astonishing to myself, who has been reared in a cotton region, and accustomed to see the largest yields.

I believe select stalks can be found to yield over double what the best stalks of the Pettit Gulph can do; and I have bought one bushel selected from the field (by favor of the introducer) for $10 to test its production.

There are other cotton seeds planted in this section of the country, none of which I have seen, except one of them, and another very limited.

The *Banana* cotton has been higher lauded than any other; but the price of seed, $100 per bushel, precludes all further trials until the price falls. I have seen about the half that was planted, and know its history; but being bound to keep it to myself, I can only say the the product is as good as Hogan's.

Brown seed.—I planted a few seed to test it with Sugar Loaf, and I prefer the Sugar Loaf. Its friends give it far more credit than I can the Sugar Loaf. Another of the same family, *Tarver seed*—I brought a few from Alabama, and planted with Brown and Sugar Loaf. For me, neither yielded or picked as well as the Sugar Loaf. Pitt's Prolific I never saw, but have heard from others that it is the best yet known. I would not be surprised when prices rule down to $1, that there is found to be only two kinds, and that the six names are all the result of competition. At all events, before this meets the public eye, I can injure no one.

If the Hogan seed holds its own, the rich lands of the southwest will produce all the cotton, because we can grow all we can gather, and thus gather more than now, which will cause a greater crop than has ever been made. Reduce prices, and the old States and their land planters must quit or starve.

I have a letter from a friend in Georgia, one of the best agricultural writers south. He says: "The planters of Georgia and South Carolina must abandon their homes or their system of agriculture. Three or four bales of cotton per hand, at present prices, cannot sustain nature. We must quit or starve."

That the culture of cotton has improved in the southwest, there is no kind of question. I settled here in 1830, and I worked harder on fresh land, and thought then six bales was a big crop; now I think it a small one. I had five bales of 400 out, and off to

market by the 1st of November this year; my corn, peas, and potoes all housed.

Cotton is the most important crop grown in the United States. By it thousands are fed, and millions are clothed. It is the bond of Union between the south and north, between the old and new world, therefore I have dwelt long upon it.

The *oat* crop was about as last year. It is only planted for food in summer.

Indian corn.—The planters of Mississippi are bestowing more attention upon corn. Every year gives a larger yield. I think the crop of 1848 is the largest ever made, the seasons suiting, and more being planted. I know a valued friend who declares that he made 1,200 bushels with one horse and only one regular hand; that he stole some additional hoe-work from his wife by taking her house chaps, his plantation not being where he resided.

My own crop is full 250 bushels per hand, and an average of 35 bushels per acre.

The *sweet potato* crop is one-quarter short at least from general report. Too wet a part of the time, too dry a part, and too grassy all the time.

Hay, corn-blades, or fodder, and pea vine, are all used as the forage crop.

There is not as much hay gathered as the northern people gather, yet we gather a large quantity of blades, and some pea vine.

Early fodder was much injured, but late fodder saved well.

I house all my provender, and as a specimen of what some do, I give you from my note book what I housed—

7,240 bundles, say at $1\frac{1}{2}$ lbs.	10,860
5 loads of hay of 4 mules, say	5,000
4 loads pea vines, say hay value	6,000
21,860 lbs. fodder and hay, or a ton per hand	21,860

Admit I save greatly over the average, and place it at an average of three-quarters of a ton per hand; then will the crop of Mississippi be 90,000 tons instead of 800. Suppose we have only one horse to two hands, this gives 60,000; add to this carriage and riding, race and livery stable horses; these were assessed in 1845 at $270,460; placing at even $100 each, there would be 2,700 more, say 6,500 horses, and then hay one-half, it would take 100,000 tons to feed our stock.

The orchard.—There is a certain progress made in orchards, and in less than five years Mississippi will certainly ship largely fruit to New Orleans and elsewhere.

The spirit of improvement is gradually progressing, bringing into its pleasant circle many who were opposed to it five years ago. Many of our people are early feeling their want of comforts, as the means of acquiring wealth by cotton culture are passing away. The consequence is they are becoming more devoted to home and its enjoyments.

Stock generally are receiving more attention. Hogs are increasing in number and the more expensive cattle are becoming less numerous. There are more horses and mules reared, and should present prices of cotton and the high prices of mules and horses be kept up for a very few years, Mississippi will rear the most of her work stock.

I might say something on the subject of the use of improved implements, but really I am so discouraged by the want of patronage received by R. L. Allen & Co., in New Orleans, that I cannot feel as if there were improvement.

I dare not affirm that the planters of the South are the only persons who are so afraid of being humbugged that they often become alarmed if they see a plough painted, but they are nevertheless exceedingly cautious of new things.

I have owned some of the improved ploughs, cast mould boards, shares and points, for about five years. I have taken every opportunity to show them and to allude to them. They have not cost me a cent for repairs. I admit that some I have bought have had the points broken, and one had the mould broken. Such things happen with the best wrought ploughs, in our rough land, and the more especially with this kind of ploughs—light ones; and the point secured by only one pin, the corner where hole was, broke out.

The south will not resort to labor-saving implements, nor to permanent improvements, until, like our brethren at the north, we are forced to exertion and to economise.

It requires no skill, no knowledge, no science, to make five or six, or eight or ten, bales per hand, owing to land; all that is required is to plant enough, and then to push every thing to keep the crop above grass. There are many who rate themselves as very superior planters, because by working 14 to 16 hours per day they make more bales than their neighbors who work only 10 to 13 hours. If, sir, any thing in the above can aid our good cause, I beg you to use it as seemeth to you most proper.

With sentiments of the highest regard and profound respect, I am, very sincerely, yours,

M. W. PHILIPS.

Hon. Edward Burke,
Commissioner of Patents.

Edwards, Miss., *November* 6, 1848.

Sir: There is one subject that I would like to bring to the consideration of the planting interest, especially of the south. It is the keeping of a full team, or rather what would be called a surplus team.

There is too much reliance on the hoe for cultivating crops; the consequence is, land cannot be cultivated as it should be. Many object to a full team, on the score of the cost of feeding. I admit if no more corn and provender were made than is now done, that

it would be a bad business. But when there is team to rest, and some pasturage provided, there is no need of so much corn; and work horses will be found to live longer, and less liable to cholic and other diseases. I know of one plantation where there are over fifty hands, with a horse to each; and the owner assures me that there are horses there over twenty years old, and that in two years he has had but one case of cholic. The stock are regularly fed in proportion to what they eat, not feeding any as much corn as is usual; at no time are all the horses at labor, and frequently one half are in the pasture. From the fact that they get grass nearly every day, and do not get a superabundance of corn, they are not burnt out like the whiskey drinkers. The gentleman above alluded to lived with me nearly five years, and says the horses where he now lives are always in better condition than any farm horses in the south that works well that he has ever seen.

The saving of horseflesh is one gain, and the ease with which a planter can brush over and over his crop in a press of work is another gain.

For the past six years, I have kept a full team, and I have been enabled to make corn to spare every year but one, and that one I had the largest cotton crop in the ground I ever had—twelve acres per hand. The consequence was, I fell short not ten bushels per hand, though I am satisfied, from my own experience of six years, and I might say nine, for the other three years I used more teams than is usual, that true economy lies in having a superabundance of teams. I will close by adding, that, my neighbors will, to a man, agree that I have improved my land since I have taken the directions—nine years—although I have averaged over seven bales, with my meat and corn.

With great respect, yours,

M. W. PHILIPS.

Hon. Edmund Burke.

Statistical Bureau of the State of Louisiana,
New Orleans, December 15, 1848.

Dear Sir: In compliance with your request and my promise, I shall make a few hasty notes touching upon our industry, etc., confining myself, as nearly as possible, to the line marked out in your circular and private communications. I cannot suppose you will attribute my delay to any want of interest in the great cause in whose promotion you are engaged.

Correct and reliable statistics are most difficult of attainment in our country, and especially in the newer States. The southwest has only lately taken any interest whatever in the matter, and Louisiana, hitherto as backward as her sister States, has made what may be regarded the first movement.

At the last session of the legislature, an act was passed establishing a *bureau of statistics*, with a view in some degree of amending this defect; and, although the appropriation made was

small, there can be little doubt that, a beginning being had, the best results will be realized hereafter. The example, too, may be followed in other States; and to this end I have directed, to the executive departments of each of them, copies of the annexed circular, (A,) calling for a general co-operation on their part. The circular has also been extensively circulated throughout Louisiana.

It is quite clear to me that the statistics of this Union can never be had through the unaided power of the general government, although very much be done by means of the decennial census, and the invaluable labors of the Patent Office. The States themselves must move conjointly; and were an annual report provided for by each of their legislatures, embracing all the subjects of industrial interest, and an embodiment in a single volume of them all at Washington, would shed a flood of light upon the resources, capacities, and powers of the nation, which in vain we seek from other quarters. The expense of this to the States would be trivial, the advantages incalculable. Nothing is more important in sound legislation than a knowledge of the country which is to be governed.

In many parts of Europe, statistical researches are pushed to an extent which must surprise us in this country. Nothing is omitted which can tend to show the condition of the people and the operations of their industry.

They even elevate these researches to the dignity of a science. In arbitrary governments this may appear a dangerous and offensive inquisitiveness; but where men are free, such jealousies cannot be felt. In republics, and especially in ours, an enlightened appreciation of the public weal will induce a general co-operation upon the part of every citizen. No man has an interest in concealment—none may shrink away from the tyrannical exactions of the rapacious tax-collector. Let all the States imitate Massachusetts, for example, in the spirit which she has already exhibited, and the minute statistical reports of her population and industry she has contributed for the benefit of the nation.

In respect to Louisiana, I must say that our *bureau* is too much in its infancy to have produced any results; answers have not come in to the circulars, so that an elaborate report is not at present practicable. The law, too, which establishes it is defective. The appropriation is not large enough, and parish officers, under penalty, should be called upon annually to report to the *bureau*. Voluntary information cannot be depended upon. I intend suggesting such an amendment of the act, at the next session of the legislature, as will entirely provide for all the exigencies of the case, and doubt not it will be carried into force.

The late establishment of a professorship of *Political Economy, Commerce and Statistics*, in the University of Louisiana, through the liberality and public spirit of the honorable Maunsel White, evinces an increased sense of the importance of these subjects; and without doubt the chair, the only one of the kind in the Union, will exercise salutary influences here, and be adopted in the colleges of our sister commonwealths. The chairs of *Practical Agriculture, Agricultural Chemistry, Manufactures, Civil Engi-*

neering, &c., which are springing up throughout the Union, evidence a sound progress of public opinion.

But I must leave these subjects, to turn to the equally important ones of your circular.

1. *In regard to agricultural societies*, I am sorry to confess our extreme backwardness. The planters have not been partial to these valuable associations among themselves, which in other States have produced such valuable results. I know not of any parish agricultural societies in the State, and I hardly know if I ought to say that our *State Agricultural Society* is still in existence. This society was established by a number of gentlemen at Baton Rouge, and has had four annual celebrations. Orations were delivered, reports read, and agricultural and manufactuing products exhibited. No general interest, however, was evinced in the society, and the attendance and patronage were always very limited. I know not whether the enterprising gentlemen of Baton Rouge, now that the State government is removed there, will allow this institution to remain in its present drooping condition, as the last anniversary was not celebrated; or whether they will go to work in earnest, in an efficient organization, which shall extend its influences to every section of the State. The legislature made an appropriation of $500, a year or two ago, in aid of the association, and would, without doubt, always be liberal in the matter. Colonel P. Hickey is president, and S. D. Henderson, esquire, secretary, Baton Rouge. The only other industrial association I know of is one for mechanics, now forming in New Orleans.

I ought to remark that several years ago an effort was made to establish an experimental farm in this State; but from some mismanagement, the only result was a large expenditure of public money, and a prejudice against a really excellent measure. Several thousand dollars were appropriated for a botanical and geological survey of the State; and why the results were not published, it is difficult to say. Even the manuscript reports of them, which must be very interesting, cannot be found after utmost search among the archives. Yet the money has been spent. At this moment we know literally nothing of the geology of Louisiana.

Our legislature, at the last session, passed the following act, which is important to you. (B.)

2. I come now to speak of the *agricultural products of the State*, and the prospects for the present season.

Sugar, which is the important staple of Louisiana, presents itself first. On this, however, I will be brief, since the mission of Mr. Fleischmann to this State, where he is now engaged prosecuting researches upon this crop, its machinery and manufacture, in the service of the Patent Office, will present everything that is of interest or desirable. He is an enlightened and scientific man, whose opinions, I think, may be relied upon. I have not yet, however, had an opportunity of inspecting any part of his report, though I trust it will be published *in extenso*, with all the drawings and illustrations, so little is known of these matters in other States, and so much desire is there for information. The planters

of Louisiana will be indebted to you for this act of attention to their interests, and to the present government for the scientific investigation of Mr. McCulloh. I know of nothing that would be more important and valuable now than a rigid *analysis of the sugar soils of Louisiana and Texas*. None has yet been made that is satisfactory. To be done thoroughly it would be an expensive matter, but could not otherwise than amply repay the expenditure.

The sugar limit of Louisiana is rapidly extending. At present it embraces the country on both sides of the Mississippi as far upwards as Point Coupee, St. Francisville, and fifty miles below the city of New Orleans; westward of the Mississippi, it includes the whole region of the Atchafalaya to Vermillion bay, etc. The extreme eastern parishes above New Orleans are engaged upon cotton. It would be fair to say that the sugar region, territorially, constitutes about one-third of the State. It is extending west and northwest, and at the present time the Red river country is substituting very largely this crop for cotton. The experiments have been attended with signal success where, some years ago, it was supposed impracticable to cultivate sugar at all. The latitude was supposed too high. However, the great improvements in machinery, enabling the crop to be much more speedily taken off, and the depression in the cotton interests, have been working a revolution. The Red river planters turn anxious attention to sugar, and it is not improbable, eventually, the major portion of them will be engaged in its production. This motion, it is true, is now retarded by the discouraging prices of sugar, and the very large outlay of capital required upon a sugar estate.

Of this I am sure, that Louisiana is alone capable of producing the whole supply of sugar demanded for the consumption of the Union, though it will require many years. With present prices, I scarcely can say how long, unless cotton remains at its extraordinary depression; an event altogether improbable. Even at present prices, the preference must be in favor of sugar, all things considered. The crop of the present year will fall greatly short of expectation; and, if I mistake not, of the last year's figure. In some parts the rains have done great mischief, and the general complaint is, that the canes at the mill have yielded badly. I know not what estimate to make in safety, as it is yet early, but am of the opinion that 200,000 hogsheads will be about the amount.

I send you, annexed, meteorological tables (C) kept in New Orleans for the last few months, by D. T. Lillie. I have not been able to get any results from the country, though it would be very interesting to compare notes, for example, between New Orleans and Alexandria, Red river. You will perceive that the amount of rain which fell last summer was extraordinary.

It is not clear when the culture of sugar cane was first introduced into Louisiana. Mr. Forstall carries it back as far as 1725–'6, or almost coeval with the colony; whilst Dr. Monette, in his "History of the Valley of the Mississippi," states the first attempt to have been made in 1751 by the Jesuits, and that Mr. Debreuil, in 1758, introduced the first mill. The product was first sent to

the mother country in 1764, the yield being stated as 3,000 lbs. to the acre, and the quality equal to that of St. Domingo Muscovado. After the cession to Spain, the sugar industry declined altogether, until near the close of the last century. Under the American government it rapidly improved, and in 1818 had reached 25,000 hhds. The first steam mills were introduced in 1822.

The varieties of cane planted are the Creole, originally imported from Malabar; the Otaheite, introduced long after; the Ribbon, brought from Georgia in 1817, being an East India variety.

SUGAR CROPS.

Year.	Hogsheads.	Price on plantation in March.
1822–'23	30,000	——
1823–'24	32,000	——
1824–'25	30,000	——
1825–'26	45,000	——
1826–'27	71,000	——
1827–'28	87,965	——
1828–'29	48,238	——
1829–'30	73,000	——
1830–'31	75,000	——
1831–'32	75,000	——
1832–'33	70,000	$5\frac{1}{2}$ a $5\frac{3}{4}$
1833–'34	75,000	6 a 7
1834–'35	110,000	$5\frac{3}{4}$ a 6
1835–'36	36,000	10 a 11
1836–'37	75,000	6
1839–'40	119,947	$3\frac{1}{4}$ a 4
1840–'41	120,000	$5\frac{1}{4}$ a $5\frac{3}{4}$
1841–'42	125,000	$3\frac{1}{2}$ a $4\frac{1}{2}$
1842–'43	140,316	$3\frac{3}{4}$ a 4
1843–'44	100,346	$5\frac{1}{2}$ a $6\frac{1}{8}$
1844–'45	204,916	$3\frac{3}{8}$ a $4\frac{3}{8}$
1845–'46	186,650	4 a $6\frac{1}{4}$
1846–'47	140,000	$5\frac{1}{4}$ a $7\frac{1}{2}$
1847–'48	240,000	$2\frac{1}{2}$ a 5

Each hogshead sugar averages 1,000 lbs. and 50 gallons molasses.

Between 1827–'28 and 1843–'44, the manual power employed in working sugar, according to Mr. Forstall, increased from 21,000 slaves to 50,670; the steam engines, from 82 to 408; the horse mills, from 226 to 354. Total capital, from $34,000,000 to $60,000,000. The last figure we regard high. It will, however, fairly represent the sugar capi al at the present moment, and shows a capital of $300 required in the production of each hogshead of sugar, and barrel of molasses of the value of (say) $45 gross. The expenses of working an estate, including wear and tear of machinery, have been estimated at $75 to the slave. Sixty dollars would be a fairer estimate. Averaging the product at five hogsheads to the hand, we have the value of hogshead, &c., as before,

\$45 — 12 = \$33 net, or about 10 per cent. upon the capital engaged in its production. Mr. Forstall, however, estimates the per centage as low as 5, and even $2\frac{1}{2}$ per cent. in some years, and draws the general inference from many tables, that when sugars average $4\frac{1}{2}$ cents and cotton $6\frac{1}{2}$ cents, and both equally good crop, the results per slave are very nearly the same; with this difference, that the capital in machinery on a large cotton estate to that on an extensive sugar one, will be as \$5,000 to \$20,000.

Cotton is the next important staple of Louisiana. The crops for the present season may be considered somewhat better than last year; the season having been more favorable with us, and the caterpillar spared its depredations. The cotton plant is mentioned in Louisiana from the earliest days of the colony. Mr. Seabrook conjectures that the Louisiana cotton of the present day is derived from a species of Sea Island, grown at the period of the revolution, and degenerated in the progress of tillage by intermixing with other kinds.

The crop of the United States will exceed that of last year. Complaints are heard of over production, and in the older cotton States they find it necessary to look to other means of support. Capital with them in this industry produces nothing. A convention of cotton-growers is daily becoming more and more popular, though it is hard to see what good such a convention can effect. The south must undertake the manufacture of her own products, and thus diversify her industry. This opinion is prevailing generally, and every few days we hear of new factories established, under the most favorable auspices, in Georgia, South Carolina, Alabama, and Mississippi. This is as it should be. In heavy products, our southern manufactures are very superior, and pay handsomely. Where experiments have been tried with slaves as operatives, they have been successful.

My own impression is, that in a state of peace existing throughout the world, the present American crops of cotton will by no means exceed the demand.

Large quantities of *rice* are produced in the State, though of a character inferior to that of Carolina. This deficiency is said to be in the manner of preparing it. Certainly the culture and machinery used by us is of the most primitive kind. The grain is bad, and it is said will not stand a sea voyage. The rice estates are mostly of small capitals, and generally owned by Creoles on the Mississippi. Below New Orleans, 40 or 50 miles, a large number of these rice planters may be found. The crop is understood to be even more profitable than sugar. We can little doubt that rice will one day become an important staple of Louisiana, for which we have abundant soil; but then it will be necessary to borrow from the experience and skill of our Carolina friends.

Indigo was formerly produced in this State by the French in quantities. We now hear no more of it.

The finest qualities of *leaf tobacco* may be grown, and we have

seen specimens produced on Red river, and in the Florida parishes, equal to the best Havana.

Some attention has been given to *silk*, and a bounty allowed for its production. Scarcely any results, however, have been achieved of a general character. Sugar and cotton have absorbed the whole capital and industry of the State.

We grow no wheat, barley, rye, &c., as crops. The planters have been compelled to buy their corn from Kentucky and Tennessee, though they are very generally giving attention to its production. We know a great many large estates that buy very little, and cannot but think it the interest of all to supply their own demand in this article of food. The crops with us this year are good, and the yield to the acre may be estimated at from 25 to 50 bushels.

The orchard receives no attention, though we might doubtless have very fine fruits. Our apple sand peaches are very indifferent. We hav occasionally seen very fine strawberries in private gardens. The grape is attracting attention, and we know several who are experimenting with the *Scuppernong*. Our *figs* are superior. We produce fine *oranges* in abundance, and many small planters make them a source of profit. The trees have been greatly injured by the rust.

Our butter and cheese, pork, lard, &c., are brought to us from the western States; we import thence also cattle, horses, mules, &c.; although upon the prairies of Louisiana the finest herds of cattle are found, which supply the markets of New Orleans to a considerable extent. This should be an abundant cattle region. Mules are being generally adopted in Louisiana for agricultural purposes. Our mutton is celebrated, though little attention is paid to sheep, and none whatever to the subject of wool. The specimens of fine foreign wools which were sent from the Patent Office are now preserved by this bureau. I can give you no particulars about the minor products.

Our agriculture is not sufficiently advanced for anything to have been achieved in regard to the rotation of crops and manures. The only rotation I may mention is corn with peas. Our manures are compost, cane trash, and pea vines, &c.

The wages of agricultural laborers will vary from \$12 to \$20 per month; the former for female, and the latter for stout males. Agricultural laborers however are seldom hired, at least for field work.

The average price of the transportation of a hogshead of sugar, by water, to market in Louisiana will be \$1 to \$1 25, and about the same for a bale of cotton; this will, however, depend upon the state of the waters, &c.; rates may sometimes go up very high. Our State, by means of bayous and rivers is blessed with abundant water facilities, though in the western portions the difficulties of transportation are very great. It may be found almost impossible to get a crop to market, and then the land carriage necessary will be considerable. Doubtless many improvements could be made in the common roads of the State, and some short railroads built to advantage. We know of two or three in projection, though our

past experiments have been such failures that we move with hesitancy in the matter. The legislature has expended, and still expends, annually immense amounts for opening water communication, &c.; more, perhaps, than any other State in the Union.

But I must draw this hasty paper to a close. I look upon the Patent Office as destined to be a kind of HOME DEPARTMENT, and trust to see it organized to that end.

In looking over my circular annexed, you will find I have drawn attention to the subject of the *trade between the States*, which cannot appear in the tables of the general government, and does not now appear at all. You have earnestly pressed this matter, over and over, and I notice many pages in your reports calculated to shed light upon it. We must get the *home trade*. How important is it to know the relative dependence of State upon State in this great confederacy! Would it not correct and allay those jealousies which so unhappily show themselves at times? How much does Louisiana receive from Ohio, from Kentucky, from Massachusetts, &c., &c.? How much does she annually send to those States, &c., &c.? How can these *data* be obtained?

Another important subject is *taxation*. Can we not have an annual table showing the proportion of taxes to wealth or population in each of the States? In this way better notions can be formed of the excellency of their political institutions, &c.

I have not made any remarks in regard to the commerce, &c., of our great emporium, New Orleans; as, without doubt, your statistics will be full from other sources. The present summer population may be estimated at 120,000—winter population, 160,000; though no reliable census has been taken for many years. The city still grows in population and trade, at an extraordinary pace. The number of new buildings every year is immense; rents continually rise. The city of Lafayette, which joins us, advances in the same progression. Should a southern overland communication be had with the Pacific, China, &c., New Orleans must become the greatest commercial mart upon the continent, perhaps in the world. In any instance, she will press hard upon New York within a generation or two. With such a back country, and such proximity to Mexico, the West Indies, California, &c., what may not be anticipated in the future? The past of New Orleans appears almost a dream!

With great respect, your obedient servant,

J. D. B. DE BOW.

Hon. EDMUND BURKE,
Commissioner of Patents.

A.

BUREAU OF STATISTICS, DEPARTMENT OF STATE,
New Orleans, *July* 1, 1848.

SIR: A bureau of statistics having been established, and the undersigned entrusted with its charge, he begs to invite from citizens

in every section of the State, such information as they can impart in regard to its present condition and past history.

The appended queries will give an idea of the character of the facts required, and will be suggestive of others. The plan of the bureau contemplates *every kind of information concerning the State*, and it will be in the power of most persons to communicate something upon one or more of the heads. It is of very great importance that the report contemplated to the next legislature be complete.

The aid of members of the legislature, editors, public officers, citizens, &c., in all the parishes is invoked, and will be most gratefully acknowledged.

Donations of old files of newspapers, records, etc., to be deposited in the bureau, will be thankfully received and acknowledged.

J. D. B. DE BOW.

1. Time of settlement of your parish or towns; dates of oldest land grants; number and condition of first settlers; whence emigrating; other facts relating to settlement and history.

2. Indian names in your vicinity; what tribes originally; what relics or monuments of them; if Indians still, in what condition.

3. Biography, anecdotes, &c., of individuals distinguished in your vicinity in the past for ingenuity, enterprise, literature, talents, civil or military, &c.,

4. Topographical description of your parish, mountains, rivers, ponds, animals, quadrupeds, birds, fishes, reptiles, insects, &c., vegetable growths, rocks, minerals, sand, clays, chalk, flint, marble, pit coal, pigments, medicinal and poisonous substances; elevation above the sea; nature of surface; forests or undergrowth; what wells, and quality of well water; nature of coasts; does the water make inroads; mineral springs; caves; etc.

5. Agricultural description of parish; former and present state of cultivation; changes taking place; introduction of cotton, sugar, rice, indigo, tobacco, grains, fruits, vines, &c., &c.; present products; lands occupied and unoccupied, and character of soils; value of lands; state of improvement; value of agricultural products; horses, cattle, mules, hogs, and whence supplied; profits of agriculture, prices of products; new estates opening; improvements suggested in cultivation, and new growths; improvements in communication, roads, bridges, canals, &c.; kind and quantity of timber, fuel, &c.; state of the roads, summer and winter; kinds of enclosures, and of what timber; manures; natural and artificial pastures; agricultural implements used; fruit trees, vines, and orchards; modes of transportation; extent of internal navigation; levees, &c.; modes of cultivating and manufacturing sugar in use.

6. Instances of longevity and fecundity; observations on diseases in your section; locations healthful or otherwise; statistics of diseases; deaths; summer seats, &c.

7. Population of your parish; increase and progress, distinguishing white and black; Spanish, French, American, or German origin; foreigners; classes of population; number in towns; growth of towns and villages, etc.; condition, employment, ages, compara-

tive value of free and slave labor; comparative tables of increase, marriages, births, &c.; meteorological tables of temperature, weather, rains, &c.

8. Education and religion; advantages of schools, colleges, libraries enjoyed; proportion educated at home and abroad; expense of education; school returns; churches or chapels in parish; when and by whom erected; how supplied with clergy; how supported and attended; oldest interments; church vaults, &c.

9. Products in manufactures and the arts; kinds of manufactures in parish; persons employed; kind of power; capital, wages, per centum profit; raw material; sugar and cotton machinery and improvements; kind and value; manufacturing sites, &c.

10. Commercial statistics; value of the imports and exports of Louisiana, with each of the other States of the Union, as far as any approximation may be made or data given; growth and condition of towns; increase in towns, &c.

11. General statistics; embracing banking, railroads, insurances, navigation, intercommunication; learned and scientific societies; crime, pauperism, charities, public and benevolent institutions; militia; newspapers, &c.; application of parish taxes; expenses of roads, levees, &c.; number of suits decided in different courts; expenses and perfection of justice; number of parish officers, lawyers, physicians, &c.

12. Date, extent, consequences, and other circumstances of droughts, freshets, whirlwinds, storms, lightnings, hurricanes, or other remarkable physical events in your section from remote periods; other meteorological phenomena; changes in climate, &c.

13. Literary productions emanating from your neighborhood; your associations, if any; what manuscripts, public or private records, letters, journals, &c.; or rare old books, interesting in their relation to the history of Louisiana, are possessed by individuals within your knowledge; state any other matters of interest.

B.

No. 211.—*Resolution.*

Whereas, the culture of the sugar cane is one of the chief resources of the wealth and prosperity of this State; and whereas, it is apprehended by many that the ribbon cane, the most valuable variety now cultivated in the State, may eventually become deteriorated as the Creole cane has already been, by constant reproduction, without any change of soil or climate; therefore—

Be it resolved by the Senate and House of Representatives of the State of Louisiana in general assembly convened, That the delegation of the State of Louisiana to the Congress of the United States be and is hereby requested to make application to the Secretary of the Navy, and to other proper authority, to the end that proper instructions be given to the commanders of the public vessels of the United States, cruizing in the waters of those countries where the cane is indigenous, for procuring for distribution amongst the cultivators of the sugar cane in this State, the seed of such varieties

of the cane as may be found in the countries aforesaid, and as may be susceptible of reproduction by the grains or seeds borne by that plant.

Be it further enacted, That the governor be and he is hereby requested to forward a copy of this resolution to our senators and representatives in Congress.

PRESTON W. FARRER, *Speaker*.

C.

Abstract of a Meteorological Journal for 1848.*

[By D. T. Lillie, at the city of New Orleans. Latitude 29° 57′; longitude 90° 07′ west of Greenwich.

Weekly. 1848.		Thermometer. Max.	Min.	Range.	Barometer. Max.	Min.	Range.	Course of wind.	Force of wind—ratio 1 to 10.	Rainy days.	Quantity of rain.
											Inches.
April	30....	86.0	71.0	15.0	30.20	29.75	0.45	SE.	2¾	0	0.000
May	6....	87.5	70.0	17.5	30.25	29.87	0.38	NE.	3	0	0.000
	13....	85.0	72.5	12.5	30.32	29.79	0.53	E.	3½	0	0.000
	20....	85.5	72.0	13.5	30.32	29.98	0.34	SE.	3½	3	7.750
	27....	91.5	74.0	17.5	30.16	29.90	0.26	SE.	2¾	2	3.925
June	3....	88.5	73.5	15.0	30.05	29.70	0.35	SSW.	3	4	10.445
	10....	88.5	74.5	14.0	30.15	29.90	0.25	SE.	3	3	3.090
	17....	82.5	71.0	11.05	30.18	29.94	0.24	ESW.	3½	7	15.471
	24....	90.5	74.0	16.05	30.30	29.95	0.35	SW.	2¾	2	1.300
July	1....	89.0	75.0	14.0	30.13	29.95	0.18	S.	3	6	4.867
	8....	90.7	77.0	13.7	30.17	29.88	0.29	W.	3¼	2	0.638
	15....	89.0	73.5	15.5	30.20	29.60	0.60	SW.	3¼	2	1.275
	22....	87.0	74.5	12.5	30.10	29.87	0.23	S.	3	6	3.160
	29....	84.0	74.5	9.5	30.24	30.08	0.16	S.	2½	6	4.170
August	5....	90.0	76.0	13.0	30.26	30.00	0.26	SW.	2½	3	0.658
	12....	88.5	74.5	14.0	30.26	30.04	0.22	E.	3	6	4.365
	19....	87.0	75.5	11.5	30.12	29.95	0.17	SE.	4	3	2.190
	26....	86.0	76.5	9.5	30.30	29.95	0.35	N.	3	3	2.125
September	2....	91.0	78.0	13.0	30.20	29.90	0.30	NW.	2¾	2	0.125
	9....	87.5	75.0	12.5	30.18	30.00	0.18	SW.	3¼	2	0.880
	16....	89.5	77.0	12.5	30.19	29.95	0.24	SE.	3	1	0.850
	23....	86.0	65.0	21.0	30.30	29.90	0.40	NE.	3¾	1	0.220
	30....	82.5	60.5	22.0	30.22	29.90	0.32	NW.	3½	0	0.000
October	7....	84.0	58.5	25.5	30.50	30.06	0.44	NW.	3½	0	0.000
	14....	84.5	70.0	14.5	30.35	29.94	0.41	N.	3	1	0.595
	21....	83.0	59.0	24.0	30.43	30.04	0.39	W.	3	1	0.285
	28....	80.0	67.0	13.0	30.32	30.00	0.32	SW.	3¼	3	1.350

* Preserved in New Orleans Medical Journal. See Nos. for July, September, and November, 1848.

REMARKS.—The thermometer used for these observations is not attached to the barometer, but is a self-registering one, and is placed in a fair exposure. Regular hours of observation, 8 a. m.; 2 p. m., and 8 p. m. The barometer is located at an elevation of 19 feet above the level of the ocean, and is suspended clear of the wall of the building. The rain-gauge is graduated to the thousandth part of an inch, and the receiver is elevated 40 feet from the ground. It will be perceived, by refererence to the rain column, that but a small quantity of rain has fallen during the last 9 weeks—say about 4⅓ inches. During the corresponding period last year, there fell upwards of 13 inches; and in the same period of time in 1846, 7 inches.

JACKSONBOROUGH, EAST TENNESSEE,
January 5, 1849.

SIR: I have received, to-day, the circular you did me the honor to address to me, making certain inquiries relative to this portion of the country, and regret I had not had them earlier, for at this late hour, when your report, I presume, is about made up to be laid before Congress, it is not in my power to obtain all the information required in time to be embodied in your present report. Being, besides, but a temporary sojourner in this land, I am in possession of those facts only which I was led to obtain with, at the time, no other object but to gratify my curiosity as a traveller in a strange land.

But I have seen enough of East Tennessee to satisfy me that it is a land abounding in rich agricultural soil, and in abundance of various minerals, such as iron, lead, zinc, emery, copper, copperas, coal, saltpetre, Epsom salts, marble, burstone, gypsum, &c., &c., in the mountains. The climate is represented to be excellent and healthful by the inhabitants of the lowlands and highlands. Not above one-quarter part of East Tennessee is under cultivation, the original forests covering yet, at least, three portions in four of the whole district. Indian corn is chiefly grown, of the white and flat kind; next, wheat, oats, and rye. The first of these cereals is gathered at an average of thirty-five bushels per acre, at a cost of ten cents per bushel. The second at an average of twenty-seven bushels, and at a cost of thirty-three cents. The third at an average of twenty bushels per acre, at a cost of five cents. As to rye it is very uncertain.

At least three quarters of the population are white, and as there is but little demand for labor, it is comparatively low, say one hundred dollars per annum, including finding of food and lodgings, for white men; and sixty-five dollars per annum, with food and clothing, for male slaves.

Agriculture, generally, is at a very low ebb in this sequestered part of the Union. I can hear of no societies in existence for the promotion or improvement of that branch of industry. Rotation of crops, if at all known, is not practised; for in nine cases in ten a field is worked in Indian corn, without being once manured, until the richness of the soil is exhausted, when it is abandoned, and a new clearing is made which undergoes a like treatment.

Very little attention has been paid to the rearing of horn and other cattle for grazing, although it may be done at scarcely any outlay of money or trouble, as the mountain ranges furnish abundance of food in the spring, summer, and autumn, and generally in winter, as but little snow falls, and it very seldom lies a whole week on the ground. The formation of the country, a succession of hills and mountains abounding in fine pasturage, and water everywhere, together with a mild climate, would make it one of the first for the breeding of sheep, were it not for the legions of dogs to be found in every farm-house, but principally in the log cabins of those who can less afford to feed them, who destroy them,

and have ruined every one who has attempted to raise a flock of these valuable animals, and deters capitalists from coming here to embark in the raising of wool.

The only manufactures consist of small cotton, woollen, and iron mills. The whole country affords water power to any extent.

Fruit of almost all kinds are plentiful, and various varieties of grapes introduced here from other sections of the Union and Europe have realized every expectation. As the tea plant is attracting some notice at the present time, I should think the conformity of this country and its climate, to that of the best tea districts in China, would admit of little doubt of its satisfactory cultivation in every part of East Tennessee.

Owing to the absence of means of transportation over turnpikes, canals, or railroads, not one of which is to be found, the expense of carrying the produce of the country in wagons, for any distance, would more than absorb the value were it attempted to convey them in this mode to any of the great markets, and hence the cause of the low state of agriculture. Raising of cattle has a better chance as they may be driven off, at any time, to the northern or southern cities.

With regard to that part of your inquiries respecting the probable average consumption of food per individual, I am informed that in a family consisting of six persons of all ages, it would be found to be on the average, viz: forty bushels of Indian corn, twelve of wheat, thirty of Irish and sweet potatoes and turnips, twelve hundred pounds of pork, four hundred pounds of beef, and eight dozen of poultry, besides game and fish, per annum. I may be allowed the pleasure to add, that as far as I have had means of observation, I have found temperance the general rule, and departure from it the exception, in private life and at county meetings. Indeed no spirituous liquors, even cider, is kept on sale by the generality of country store keepers; certainly by none of the respectable ones.

Except groceries, and some hard and crockery wares, the articles to be had at the country stores, for domestic use, consist almost wholly of American manufactures.

There are three banking establishments in East Tennessee, and all these are branches of banks located at Nashville.

As I have already, said I regret that I have neither time nor opportunity to give you the statistical details you require. I am here for the winter only, and my residence of two months in different sections of this portion of the State makes me but poorly competent to fill the task you have put on me without previous notice. But I have endeavored to answer your call as soon and as well as in my power, and I may say with every desire to add my mite of information to the great mass which you embody, annually, in your useful and valuable reports to Congress.

I have the honor to be, sir, your most obedient servant,

J. BALESTIER.

Hon. Edmund Burke,
Commissioner of Patents.

BAGDAD, SMITH CO., TENN.,
February 8, 1849.

DEAR SIR: Although unsolicited, and not at a time of making up of your report, I thought it probable that I might be able to give you some information, which might assist you in some small degree in making up your next report to Congress. Through the kindness of my representative in Congress, Mr. Hill, I have been favored with the use of your report for 1847. I believe that I should not have ventured to give you any of my weak opinions, and quite limited information, only that I notice in your report on tobacco that some person or persons have given you certain statements which I think calculated to mislead the mind of those who are unacquainted with the cultivation of that article. I see on page 168 of your report, where our journal, in speaking of the ravages of the tobacco worm in its vicinity, says: "That some of the fields were literally stripped by them, and the tobacco was hardly worth the housing." I suppose that he alludes to the common worm which we here call the horn worm, as I have never heard of any other worm injuring the large tobacco. (I should first have informed you that tobacco is our chief produce for a foreign market.) We are beset with three sorts of worms: The cut worm in the spring of the year, and until hot weather sets in; these cut off the small plants; our remedy is replanting and killing them until hot weather, which finishes them. We have the bud worm, which eats out the bud of the half grown tobacco; and lastly, the horn worm, which eats and consumes the leaves; some of these grow as large as a man's little finger, and, if let alone, would eat it up before ripe. For the last five or six weeks before housing, we are compelled to pull them off and kill them as often as once a week. Industrious, good managers never lose much tobacco by them. We also worm the half grown plants for the bud worm, which is seated in the bud, and, if let alone, would top it too low.

Also, on page 170, where your correspondent, speaking of an experiment between fire curing and air curing, says: "Then one parcel was put into the barn and fire cured; the other into a house where there was no fire, and suffered to remain about five days, when it was perfectly cured. Now, I will not dispute as to which is the heaviest, or seems preferable to the inspectors; but, in this country, tobacco will not cure in a house without fire in five days, nor will it be perfectly cured in one month without fire. I have never tried it without fire; but my opinion is, that it would not be sufficiently cured in three months. Tobacco, when cut, is nearly as green to look at as fodder or weeds, and will not bear fire until it wilts and turns yellow; then we put fire to it. If we should fire it before that time, it would cure up green like fodder or hay. I have housed some; and in warm weather, I have kept it in the house for two weeks before it was yellow enough for fire; then we fire it every day for two or three weeks before it is considered safe. We then quit the fire, except on wet days, for about a month, when it will do to strip; but we hang it up again after

stripping, and let it hang near two months before we bulk it down for prizing. In cool weather, it takes longer to yellow, and longer to cure. To cure it at all without fire, it would require double the room that we give it, and that would be more expensive than the firing. To crowd it in the houses without fire, it would rot (which we call house burn) before it would cure. The tobacco has a large green stalk about one inch in diameter; also large green stems growing out of that stalk, which serves the leaves as a backbone; from these are smaller stems, as ribs. These large stems are as large as a man's finger; and of a wet season, it takes two or three months to cure them, and that with the help of fire. We commence cutting tobacco in August, and finish about the middle of October; and then there are very few planters that think their tobacco is sufficiently cured to hulk down for prizing until February, and some put down as late as April. At this time, I know of no man that has any put down. As to fire, all carpenters, or other workmen in wood, know that plank, seasoned without fire, will swell and shrink with the changes of dry and wet weather; but when cured by fire, it so kills the nature of it that wet weather will not swell it, if kept dry. So in corn or meal to be shipped, it will mould, unless dried by fire; and so with tobacco, if cured without fire, it will be more apt to mould and funk when put on water. We are in the habit of selling at New Orleans. I live in Jackson county, but on the Smith county line, near a post office called Bagdad, six miles north of Cumberland river. The south end of Jackson makes tobacco nearly to a man; the north end, grain and stock. I suppose we make, in this south end of Jackson, about six hundred hogsheads, of twelve or fifteen hundreds pounds each. We calculate on from one thousand to fifteen hundred pounds per acre. Every hand will make a hogshead of tobacco, besides other produce sufficient for the family. For the last few years, we got from $2 50 to $7 00 per hundred; average, about $3 50. At that rate, one acre of land will bring more money than in anything else we can cultivate. The county of Smith makes tobacco largely; I suppose at least double Jackson county. Our crop of 1848 is very good in quality, but not an average in quantity. Some of our large tobacco planters are turning their attention more to stock raising, particularly mules. We make no cotton for market, and not half enough for home use. I know some women, who have small families, who will plant a little patch of tobacco near the house, and make enough to bring $30 or $40, and buy their clothing out of the store. We cultivate largely of oats, which we cut and feed to our horses, mules, sheep, oxen, and milch cows. We make no hay, and but little corn fodder, by reason of being pushed with our tobacco. We cultivate considerable Irish potatoes and turnips; and of late years, begin to feed them to our milch cows, and fattening beeves; but, as to quantity, I cannot tell. I think not so good as the colder States. I have never noticed any of my potatoes diseased, as you relate of Europe, and some of our northern States; but my crop has sometimes been destroyed by small flies, somewhat like a lightning bug,

only larger, of a yellow color, nearly as large in the body as an oat straw, and near ani nch long. They eat up the vines, and then the potatoe stops growing; but early planting will nearly make themselves before the fly comes. We make considerable wheat, but not for market, for want of good mills to manufacture it. We make no hemp, no buckwheat nor barley, and very little rye. Indian corn flourishes well; we make largely, and send it down the river Cumberland. Corn will produce from five to ten barrels per acre; wheat will average ten bushels; oats, I suppose, twenty bushels to the acre; turnips, I would think, three hundred bushels per acre; Irish potatoes, one hundred and fifty per acre. The article of geese feathers constitutes a very considerable item in the profits of small families here; many of them nearly defray their store expense with feathers. The merchants buy them at about 25 cents per pound; and one retail merchant will barter for fifteen hundred or two thousand pounds in a year. Beeswax and honey has heretofore been considerable; but of late years, the moth has so destroyed our bees that but few are left. The moth is a small white worm that kills the bees, and cuts up the comb and eats the honey. I have heard of many preventives, but nothing does much good. We sell considerable pork, and raise cattle, some horses and mules. We make a little flax for home use, but none for foreign market. We make considerable cabbages for family eating, but not for stock; but, for a few years last past, I notice that lice or bugs nearly destroy them every fall. We have declined the silk business. Some few years since, our legislature chartered a silk company, and the excitement was considerable. They had a loom or two in Nashville, but I hear nothing now—no inquiry for multicaulis, or worm eggs. When I get through the book containing your report, I may have something further to write.

Very respectfully, your most obedient servant,

JAMES YOUNG.

Hon. Edmund Burke,
Commissioner of Patents,
Washington, D. C.

Prospect Hill,
Near Washington, Ky., January 4, 1849.

Dear Sir: I take the liberty of sending you one of my books on agriculture, and desire to call your attention particularly to a table of grasses, at page 234, given on the authority of Sir Humphrey Davy, and the remarks thereon in the two following pages. Number 1 in that table is supposed to be the common blue grass of Kentucky, by some called spear grass, (*poa pratensis.*) You will perceive that some of the other species of the *poa* greatly exceed the *poa pratensis* in the quantity of *grass*, *hay*, and *nutritive matter.* Numbers 3 and 8 (*augustifolia* and *poa fertilis*) would seem obe greatly superior (at least for meadow) to the *poa pratensis.* t hould like very much to have an opportunity of testing the

utility of these grasses by actual experiment; but have had no opportunity of procuring any of the seed. I presume you could, by your correspondence in England, procure some of the seed. If you can procure any in time for spring sowing I would be glad to procure a small supply.

The *poa maritaim* would seem also to be a valuable grass, but probably would suit best for the sea shore.

You will observe that there are two kinds of the *poa fertilis*, (Numbers 7 and 8,) both of which are very rich in nutritive matter.

You will see also in table III., page 236, that the different species of clover would seem also to be worthy of experiment, for the purpose of ascertaining their relative value.

As a census will be taken in the course of next year, it will lay a good foundation for correct estimates of our agricultural products, if carefully and accurately taken. Every precaution should be taken to secure so desirable a result. A small additional expense in taking the census can be of no importance, compared with the perfection and accuracy of its statistics.

Permit me to suggest that, in giving the statistics of our agricultural products, (at least the most important of them,) it would be proper to give separately the *total product* of each kind; and also that part of the product of each farm which will not be consumed by the *family* or *stock;* in other words, the net surplus for sale in kind or in value.

The crops of corn in the west are enormously great; being ranked as breadstuffs, foreigners would be at a loss to imagine how they could be consumed. But when it is considered that more than nineteen-twentieths of these crops are converted into beef, pork, mules and horses, the mystery would cease.

Now if we give the *whole value* of the corn crop, and also the amount of beef, pork, mules and horses, there would be a double valuation; but if each farmer should give the value of the beef, pork, horses and mules sold by him, and also the value of that part of his crops which he does not consume or feed to stock, all would be right.

Although farmers may not have actually sold their surplus productions when called on by the census taker, they can easily estimate the amount of their surplus produce for *sale* as contradistinguished from the amount reserved for consumption and feeding of stock.

Yours, respectfully,

A. BEATTY.

Hon. Edmund Burke,
Commissioner of Patents.

Abstract of the farm crops of Ohio for 1848.

Counties.	Average yield per acre for 1848.	Average yield per acre for the past 4 or 5 years.	Average price at nearest market.
Adams	Corn, 30 bushels; wheat, 12; oats, 10	Corn, 33 bushels; wheat, 7; oats, 20	Corn, 20 cents; wheat, 65; oats, 16.
Athens	Corn, 40 bushels; wheat, 15; oats, 25; potatoes, 75; hay, $1\frac{1}{2}$ tons.	Corn, 35 bushels; wheat, 12; oats, 20; potatoes, 150; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 65; oats, $16\frac{2}{3}$ hay, $5.
Ashtabula	Corn, 45 bushels; wheat, 15; oats, 40; potatoes, 150; hay $1\frac{1}{2}$ tons.	Corn, 50 bushels, wheat, 8; oats, 40; potatoes, 200; hay, 1 ton.	Corn, 40 cents; wheat, $1; oats, 20 cents.
Ashland	Corn, 70 bushels; wheat, 20; oats, 40; rye, 20; barley, 20; hay, $1\frac{1}{2}$ tons; potatoes, 25 bushels.	Corn, 50 bushels; wheat, 10; oats, 30; rye and barley, 15; potatoes, 40; hay, $1\frac{1}{4}$ tons.	Corn, 35 cents; wheat, 80; oats, 20.
Champaigne	Corn, 40 bushels; wheat, 18; oats, 30; potatoes, 75; hay, $1\frac{1}{2}$ tons.	Corn, 35 bushels; wheat, 12; oats, 30; potatoes, 100; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 65; oats, 15.
Carroll	Corn, 45 bushels; wheat, 15; oats, 38; rye, 20; barley, 35; potatoes, 50; hay, $2\frac{1}{2}$ tons.	About an average of the present year	Corn, 28 cents; wheat, 90; oats, 22; hay, $4; rye, 31 cents; barley, $37\frac{1}{2}$; potatoes, 31.
Clinton	Corn, 45 bushels; wheat, 20; oats, 35; potatoes, 40; hay, $1\frac{1}{2}$ tons.	Corn, 35 bushels; wheat, 15; oats, 30; potatoes, 35; hay, $1\frac{1}{4}$ tons.	Corn, 18 cents; wheat, 60; oats, 15.
Columbiana	Corn, 35 bushels; wheat, 17; oats, 50; barley, 35; hay, 2 tons.	Corn, 40 bushels; wheat, 20; oats, 50; hay, 2 tons.	Corn, 25 cents; wheat, 80; oats, 20; hay, $5.
Clark	Corn, 40 bushels; wheat, 18; oats, 40; potatoes, 100; hay $1\frac{1}{2}$ tons.	Corn, 35 bushels; wheat, 15; oats, 35; potatoes, 150; hay, $1\frac{1}{4}$ tons.	Corn, 25 cents; wheat, 70; oats, 20; hay, $5.
Cuyahoga	Corn, 35 bushels; wheat, 10; oats, 40; rye, 12; hay, $1\frac{1}{2}$ tons.	Corn, 40 bushels; wheat, 15; oats, 40; rye, 17; hay, $1\frac{1}{2}$ tons.	Corn, 40 cents; wheat, 90; oats, 25; hay, $6.
Crawford	Corn, 40 bushels; wheat, 20; oats, 33; barley, 35; hay, 2 tons.	Corn, 35 bushels; wheat, 18; oats, 30; barley, 35; hay, 2 tons.	Corn, 20 cents; wheat, 80; oats, 18; hay, $4 50.
Clermont	Corn, 45 bushels; wheat, 15; oats, 12; rye, 10; barley, 12; potatoes, 50; hay, 1 ton.	Corn, 50 bushels; wheat, 10; oats, 20; barley, 20; potatoes, 80; hay, $1\frac{1}{2}$ tons.	Corn, 25 cents; wheat, 70; oats, 20; rye, 50; barley, 50; potatoes, 40; hay, $12.
Coshocton	Corn, 60 bushels; wheat; 20	Corn, 50 bushels; wheat, 14	Corn, 20 cents; wheat, 80.
Darke	Corn, 50 bushels; wheat, 20; oats, 35; rye, 25; barley, 20; buckwheat, 15; potatoes, 70; hay, 2 tons.	Corn, 35 bushels; wheat, 15; oats, 35; and other articles an average with the present year.	Corn, 20 cents; wheat, 70; oats, 20; rye, 35; barley, 26; potatoes, 25, hay, $4.
Defiance	Corn, 50 bushels; wheat, 20; oats, 45; rye, 25; barley, 25; buckwheat, 15; potatoes, 156; hay, 2 tons.	Corn, 50 bushels; wheat, 20; oats, 40; rye, 25; barley, 20; buckwheat, 15; potatoes, 300; hay, 2 tons.	Corn, 35 cents; wheat, 85; oats, 20; rye, 40; barley, 30; potatoes, 50; hay, $5.
Delaware	Corn, 50 bushels; wheat, 18; oats, 30; barley, 20; hay, 2 tons.	Corn, 40 bushels; wheat, 12; oats, 35; barley, 25; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 75; oats, 14; hay, $4.

Abstract—Continued.

Counties.	Average yield per acre for 1848.	Average yield per acre for the past 4 or 5 years.	Averge price at nearest market.
Erie	Corn, 35 bushels; wheat, 15, oats, 35; potatoes, 25; hay, 2 tons.	Corn, 40 bushels; wheat, 14; oats, 35; potatoes, 100; hay, $1\frac{1}{2}$ tons.	Corn, 44 cents; wheat, 90; oats, 20.
Franklin	Corn, 50 bushels; wheat, 18; oats, 40; rye, 20; barley, 20; buckwheat, 20; potatoes, 100; hay, 2 tons.	Corn, 50 bushels; wheat, 15; oats, barley, rye, and buckwheat, same as present year; potatoes, 200; hay, 2 tons.	Corn, 22 cents; wheat, 75; oats, 20; rye, 44; potatoes, 60; hay, $6.
Fayette	Corn, 38 bushels; wheat, 12; oats, 25; rye, 12; potatoes, 30; hay, $1\frac{1}{2}$ tons.	Corn, 45 bushels; wheat, 10; oats, 25; potatoes, 45; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 75; oats, 25.
Greene	Corn, 50 bushels; wheat, 17; oats, 30; rye, 20; potatoes, 100; hay, $1\frac{1}{2}$ tons.	Corn, 45 bushels; wheat, 15; oats, 35; potatoes, 150; hay, $1\frac{1}{2}$ tons.	Corn, 25 cents; wheat, 65; oats, 18.
Gallia	Corn, 35 bushels; wheat, 16; oats, 35	No report	Corn, 20 cents; wheat, 70; oats, 16.
Geauga	Corn, 35 bushels; wheat, 10; oats, 40; rye, 40; barley, 12; buckwheat, 18; hay, $1\frac{1}{2}$ tons.	Corn, 35 bushels; wheat, 12; oats, 35; rye, 10; barley, 13; hay, $1\frac{1}{2}$ tons.	Corn, 35 cents; wheat, $1; oats, 25 cents; hay, $5.
Guernsey	Corn, 45 bushels; wheat, 20; oats, 40; barley, 20; buckwheat, 18; potatoes, 80; hay, $1\frac{1}{2}$ tons.	Corn, 45 bushels; wheat, 15; oats, 45; potatoes, 80; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 82; oats, 20; buckwheat, 25; potatoes, 25; hay, $4.
Huron	Corn, 37 bushels; wheat, 13; oats, 33; rye, 18; barley, 30.	Corn, an average; wheat, ten per cent. less. oats, an average crop.	
Highland	Corn, 50 bushels; wheat, 12; oats, 15; rye, 12.	Corn, 40 bushels; wheat, 10; oats, 20; rye, 12.	Corn, 25 cents; wheat, 75; oats, 22.
Henry	Corn, 45 bushels; wheat 18; oats, 45; buckwheat, 30; potatoes, 52; hay, $1\frac{1}{2}$ tons.	An average with the present year	Corn, 33 cents; wheat, 85; oats, 25; hay, $5.
Hocking	Corn, 35 bushels; wheat, 12; oats, 30; rye, 12; buckwheat, 30; potatoes, 75; hay, 3 tons; tobacco, 800 pounds.	Corn, 33 bushels; wheat, 10; oats, 40; rye, 10; buckwheat, 30; potatoes, 100; hay, $2\frac{1}{2}$ tons; tobacco, 700 pounds.	Corn, 20 cents; wheat, 65; oats, 20; potatoes, 50; hay, $5; tobacco, $3 50.
Hardin	Corn, 35 bushels; wheat, 18; oats, 30; buckwheat, 15; potatoes, 20; hay, 2 tons.	Corn, 30 bushels; wheat, 15; oats, 30; buckwheat, 15; potatoes, 60; hay, $1\frac{1}{2}$ tons.	Corn, 25 cents; wheat, 75; oats, 16; buckwheat, 38; potatoes, 30; hay, $4.
Harrison	Corn, 40 bushels; wheat, 15; oats, 35; hay, $1\frac{1}{2}$ tons.	Not so good as the present year.	
Hancock	Corn, 40 bushels; wheat, 20; oats, 40; rye, 25; potatoes, 50; hay, 2 tons.	Corn, 35 bushels; wheat, 16; oats, 40; rye, 20; potatoes, 40; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 68; oats, 18; hay, $5.
Jefferson	Corn, 40 bushels; wheat, 15; oats, 35; rye, 15; barley, 40; hay, $1\frac{1}{2}$ tons.	Corn, 30 bushels; wheat, 12; oats, 20; rye, 12; barley, 35; potatoes, 45; hay, 1 ton.	Corn, 31 cents; wheat, 75; oats, 22; hay, $4.

Lawrence	Corn, 40 bushels; wheat, 10; oats, 25; potatoes, 100; hay, 2 tons.	Not reported	Corn, 28 cents; wheat, 63; oats, 25; hay, $6.
Lorain	Corn, 30 bushels; wheat, 13; oats, 40; buckwheat, 20; potatoes, 50; hay, $1\frac{1}{2}$ tons.	Corn, 40 bushels; wheat, 15; oats, 40; rye, 10; potatoes, 100; hay, 1 ton.	Corn, 38 cents; wheat, $1; oats, 20 cents; hay, $4.
Lake	Corn, 45 bushels; wheat, 12; oats, 50; rye, 15; barley, 35; potatoes, 50; hay, 2 tons.	Corn, 40 bushels; wheat, 16; oats, 35; rye, 12; barley, 30; potatoes, 75; hay, $1\frac{1}{2}$ tons.	Corn, 40, cents; wheat, $1 oats, 25 cents; potatoes, 50.
Licking	Corn, 50 bushels; wheat, 18; oats, 30; rye, 15; barley, 25; buckwheat, 20; potatoes, 100; hay, 2 tons.	Corn, 35 bushels; wheat, 10; oats, 18; rye, 10; barley, 18; potatoes, 150; hay, $1\frac{1}{2}$ tons.	Corn, 20 cents; wheat, 80; oats, 14; hay, $5.
Morgan	Corn, 35 bushels; wheat, 20; oats, 30; hay, $1\frac{1}{2}$ tons.	Corn, 35 bushels; wheat, 11; oats, 30; hay, $1\frac{1}{2}$ tons.	Corn, 22 cents; wheat, 75; oats, 15; hay, $5.
17 *Mercer	Corn, 40 bushels; wheat, 12; oats. 30; rye, 15; buckwheat, 20; potatoes, 60; hay, 2 tons.	Corn, 30 bushels; wheat, 11; oats, 30; rye, 15; potatoes, 60; hay, 2 tons.	Corn, 25 cents; wheat, 65; oats, 20; rye, 35.
Muskingum	Corn, 50 bushels; wheat, 18; oats, 20.	Corn, 50 bushels; wheat, 14; oats, 20	Corn, 25 cents; wheat, 75; oats, 18.
Monroe	Corn, 35 bushels; wheat, 12; oats, 25; hay, $1\frac{1}{2}$ tons.	Corn, 30 bushels; wheat, 10; oats, 25; hay, $1\frac{1}{4}$ tons.	Corn, 25 cents; wheat, 70; oats, 18.
Meigs	Corn, 40 bushels; wheat, 15; oats, 35; rye, 15; barley, 20; buckwheat, 15; potatoes, 60; hay, $1\frac{1}{2}$ tons.	Not so good as the present year	Corn, 25 cents; wheat, 70; oats, 20; rye, 45; buckwheat, 50; potatoes, 35.
Miami	Corn, 65 bushels; wheat, 25; oats, 35; hay, $1\frac{1}{2}$ tons.	Not so good by 25 per cent. as the present year.	
Mahoning	Corn, 40 bushels; wheat, 6; oats, 40; rye, 10; barley, 30; buckwheat, 14; potatoes, 40; hay, $1\frac{1}{2}$ tons.	Corn, 42 bushels; wheat, 12; oats, 40; rye, 11; barley, 28; buckwheat, 12; potatoes, 140; hay, 1 ton.	Corn, 29 cents; wheat, 94; oats, 20; rye, 33; barley, 33; potatoes, 37; hay, $4.
Medina	Corn, 35 bushels; wheat, 10; oats; 40; barley, 30; hay, $1\frac{1}{2}$ tons.	Not reported	Corn, 37 cents; wheat, 87; oats, 20; hay, $5.
Madison	Corn, 40 bushels; wheat, 15; oats, 30; rye, 20; barley, 20; buckwheat, 20; potatoes, 60; hay, 2 tons.	Corn, 30 bushels; wheat, 10; oats, 30; rye, barley, buckwheat, potatoes, and hay, about the same as present year.	Corn, 25 cents; wheat, 75; oats, 25; potatoes, 50; hay, $3.
Montgomery	Corn, 45 bushels; wheat, 18; oats, 30; rye, 15; barley, 25; buckwheat, 15; potatoes, 100; hay, $1\frac{1}{2}$ tons; tobacco, 1,500 pounds.	Corn, 45 bushels; wheat, 15; oats, 35; rye, 15; barley, 30; buckwheat, 15; potatoes, 100; hay, 2 tons; tobacco, 2,000 pounds.	Corn, 25 cents; wheat, 70; oats, 20; rye, 50; barley, 37; potatoes, 25; hay, $8.
Ottawa	Corn, 25 bushels; wheat, 17; oats, 30; buckwheat, 27; hay, $1\frac{3}{4}$ tons.	Corn, 30 bushels; wheat, 12; oats, 25; buckwheat, 35, hay, $1\frac{1}{2}$ tons.	Corn, 25 cents; wheat, 90; oats, 20.
Paulding	Corn, 60 bushels; wheat, 20; oats; 40; potatoes, 100; hay, 2 tons.	Corn, 60 bushels; wheat, 18; oats, 40	Corn, 25 cents; wheat, 85; oats, 20; hay, $7.
Putnam	Corn, 50 bushels; wheat, 18; oats, 25; rye, 25; buckwheat, 50; potatoes, 150; hay, 3 tons,	Corn, 70 bushels; wheat, 25; oats, 35; rye, 30; buckwheat, 75; potatoes, 200; hay, $2\frac{1}{2}$ tons,	Corn 20 cents; wheat, 75; oats, 16; rye, 40; potatoes, $37\frac{1}{2}$; hay, $5.

Abstract—Continued.

Counties.	Average yield per acre for 1848.	Average yield per acre for the past 4 or 5 years.	Average price at nearest market.
Preble	Corn, 20 bushels; wheat, 16; oats, 15; potatoes, 50; hay, 1 ton.	Corn, 40 bushels; wheat, 12; oats, 30; potatoes, 100; hay, 2 tons.	Corn, 20 cents; wheat, 70; oats, 20; hay, $6.
Portage	Corn, 40 bushels, wheat, 9; oats, 35; rye, 8; barley, 20; buckwheat, 20; potatoes, 50; hay, 1½ tons.	About an average.	
Perry	Corn, 40 bushels; wheat, 20; oats, 50; rye, 18; hay, 1 ton.	Not an average with the present	Wheat, 75 cents; corn, 25; rye, 37.
Pickaway	Corn, 45 bushels; wheat, 15; oats, 20; rye, 14; hay 1½ tons.	Corn, 50 bushels; wheat, 14; oats, 30; rye, 16; hay, 1½ tons.	Corn, 27 cents; wheat, 75; oats, 20, rye, 40.
Richland	Corn, 35 bushels; wheat, 15; oats. 40; rye, 15; buckwheat, 25; potatoes, 5; hay, 2 tons.	Corn, 27 bushels; wheat, 13; oats, 35; rye, 13; buckwheat, 25; potatoes, 50; hay, 2 tons.	Corn, 31 cents; wheat, 85; oats, 18; rye, 31; potatoes, 37; hay, $4.
Ross	Corn, 45¼ bushels; wheat, 13⅛; oats, 22; hay, 1½ tons.	Corn, 40 to 50 bushels; wheat, 10; oats, 25; hay, 1½ tons.	Corn, 25 cents; wheat, 90; hay, $8.
Summit	Corn, 40 bushels; wheat, 10; oats, 35; rye, 12; barley, 15; buckwheat, 12; hay, 1½ tons.	Corn, 40 bushels; wheat, 10; oats, 35	Corn, 35 cents; wheat, 85; oats, 20.
Shelby	Corn, 25 bushels; wheat, 22; oats, 40; rye, 15; barley, 40; buckwheat, 20; hay, 2 tons.	Corn, 40 bushels; wheat, 10; oats, 40; rye, 15; barley, 40; buckwheat, 20; hay, 2 tons.	Corn, 20 cents; wheat, 68; oats, 17; barley, 37; hay, $4 50.
Stark	Corn, 30 bushels; wheat, 15; oats, 30; barley, 30; hay, 1½ tons.	An average with the present year	Corn, 33 cents; wheat, 94; oats, 20.
Seneca	Corn, 40 bushels; wheat, 15; oats, 40; barley, 15; hay, 1 ton.	Corn, 40 bushels; wheat, 15; oats, 35; barley, 15; hay, 1 ton.	Corn, 25 cents; wheat, 80; oats, 20.
Tuscarawas	Corn, 50 bushels; wheat, 18; oats, 30; rye, 16; barley, 23; buckwheat, 17; potatoes, 80; hay, 1¼ tons.	Corn, 50 bushels; wheat, 20; oats, 33; rye, 25; buckwheat, 17; potatoes, 150; hay, 1½ tons.	Corn, 25 cents; wheat, 87; oats, 20; rye, 37; potatoes, 37; hay, $4 50.
Trumbull	Corn, 40 bushels; wheat, 10; oats, 30; rye, 17; barley, 20; hay, 1½ tons.	Corn, 35 bushels; wheat, 13; oats, 27; rye, 15; barley, 20; hay, 2 tons.	Corn, 31 cents; wheat, 90; oats, 20; rye, 37; barley, 31.
Union	Corn, 35 bushels; wheat, 15; oats, 35; potatoes, 80; hay, 1½ tons.	Corn, 35 bushels; wheat, 10; oats, 35; potatoes, 100; hay 1½ tons.	Corn, 20 cents; wheat, 70; oats, 18.

Van Wert.....	Corn, 33 bushels; wheat, 20; oats, 30; rye, 20, buckwheat, 20; potatoes, 150; hay, 1½ tons.	Corn, 35 bushels; wheat, 12; oats, 30; rye, 20; buckwheat, 12; potatoes, 150; hay, 1½ tons.	Corn, 31 cents; wheat, 80; oats, 20; rye, 31; potatoes, 25; hay, $6.
Washington....	Corn, 45 bushels, wheat, 10; oats, 25; rye, 15; buckwheat, 20; potatoes, 100; hay, 1½ tons; tobacco, 700 pounds.	Corn, 45 bushels; wheat, 10; oats, 30; rye, 15; buckwheat, 25; potatoes, 140; hay, 1¼ tons.	Corn, 25 cents; wheat, 70; oats, 20; rye, 50; potatoes, 30; hay, $5.
Warren	Corn, 50 bushels; wheat, 15; oats, 25; rye, 12; barley, 20; buckwheat, 25; potatoes, 100; hay, 1½ tons.	Corn, 40 bushels; wheat, 12; oats, 25; rye, 10; barley, 20; buckwheat, 28; potatoes, 80; hay, 1½ tons.	Corn, 27 cents; wheat, 70; oats, 25; rye, 50; barley, 50; buckwheat, 62½; potatoes, 37½; hay, $6.
Wayne	Corn, 35 bushels; wheat, 18; oats, 45; rye, 20; buckwheat, 20; hay, 2 tons.	Corn, &c., an average with the present year.	Corn, 25 cents, wheat, 80; oats, 20; potatoes, 50; hay, $4 50.
Wyandot.......	Corn, 40 bushels; wheat, 15; oats, 35; buckwheat, 30; potatoes, 30; hay, 2 tons.	Corn, 45 bushels; wheat, 16; oats, 35; potatoes, 50; hay, 2 tons.	Corn, 20 cents; wheat, 80; oats, 18; potatoes, 50; hay, $4.
Wood	Corn, 34 bushels; wheat, 10, oats, 34; rye, 18; barley, 18; buckwheat, 25; potatoes, 20; hay, 1½ tons.	Corn, 40 bushels, wheat, 18; oats, 40; rye, 27; barley, 25; buckwheat, 40; potatoes, 30; hay, ½ ton.	Corn, 31 cents; wheat, 81; oats, 25; rye, 37; barley, 28; buckwheat, 31; potatoes, 44; hay, $6.

LEESBURG, HIGHLAND COUNTY, OHIO,
October 8, 1848.

SIR: I avail myself of the opportunity of giving you the information you requested in your circular.

In regard to our crops of the present year, it is gratifying to know there is everything in abundance compared with the year 1847; 50 per cent. better in the aggregate.

Our corn crop will average throughout the State 75 per cent. more than last year, and of a greatly superior quality. Our spring was rather cool and dry about planting time, which is about the 1st of May, and continued so until about the 1st of July. Then we had very wet weather during that month, which caused our corn to fill out well. We consider a dry June and a wet July favorable for a good corn crop in this region. Our corn crop in Ohio the present year will perhaps average 50 bushels to the acre, and of a well matured and good quality. Our farmers are adopting a better mode of cultivation in regard to their corn crop, and the result has amply paid them for this enterprise. In many instances, from 80 to 150 bushels are now produced to the acre; and I am clearly of opinion that, with proper treatment, any of our land can be made to produte 100 bushels to the acre on an average. But, as a matter of course, we should have to confine our ourselves to a less quantity of ground, and cultivate in a better manner. To raise 100 bushels of corn to the acre, I should want good sod of any kind of grass, at least three years' standing, well turned over, in January or February, with a double ploughing—one plough to cut and turn the sod, and the other to follow immediately after and break the sub-soil at least ten inches. In the month of April, and immediately previously to planting, and when the ground is in a dry state, roll it with a roller sufficiently heavy to pulverize the ground on top and settle the sod beneath. Then harrow it until you can stir the ground with your foot. Then spread about ten loads of manure to the acre, and harrow or plough it in immediately, in order to save the strength of the manure. Furrow off poor ground four feet apart, and plant the corn one foot apart in the row, two stalks in a hill. Work it well when small with the cultivator and afterwards with the plough. Do not disturb the sod, and I guarantee from 80 to 100 bushels to the acre, instead of frequently not more than 30 or 40, and that of an inferior quality.

Our wheat crop is at least 50 per cent. better the present year than last, owing I suppose to the cool, dry weather during the whole of spring up to the time of harvesting. The amount sown throughout the State would not perhaps be more than an average. But the quantity to the acre and the quality is far superior to anything since 1839. I live in one of, perhaps, the best wheat counties in the State, which is Highland, and it seems to be one of the great staples of the county. I was informed by Mr. Marfield, one of the principal wheat buyers of Chillicothe, that the best wheat he had ever bought, or ever saw, came from Highland. He also informed me that the golden-straw was the best wheat. There seems

to be considerable enterprise among our farmers about the manner of cultivating the wheat crop in this section of the country. The amount of wheat sown this fall will, perhaps, about average with our last crop.

Our oats crop will, perhaps, fall short this season about 25 per cent. less than the last, owing to the dry, cool weather in the fore part of the season, and the wet weather at the time of taking care of them. The quantity sown perhaps was not far different from last year. If any difference, it was something less.

Rye, for the last few years, has not been cultivated; I suppose from the fact that our distilleries have, to a great extent, gone down, and rye does not make as profitable feed as other grain that can be raised as easy and with as little expense.

Buckwheat is an article that is not cultivated to a very great extent. The most that is raised is for home consumption. The quantity sown this year will fall short perhaps 10 per cent. of what it was last year. But the deficiency in quantity will be made up in quality; so that, perhaps, there will be 10 per cent. more this year than last. It is not considered among our farmers a profitable crop. A cool, wet August is considered the kind of weather for a good crop of buckwheat.

The present season has not been considered the best for hay. In the spring it was too dry and cold, and continued so till it was too late for the meadows to recover without a considerable failure. The season also was bad for taking care of or making hay, so that our present crop must fall short of last year 15 per cent., and of a greatly inferior quality.

Clover hay was better this year than last, as it was wet enough very early in the spring for it to commence growing, and the weather for making and taking care of it in June was very favorable. The crop of this year was, perhaps, 10 per cent. better than last year. The crop for seed has been very good, owing to a wet July and August. I think it would be a safe estimate to put the yield of the present crop of clover seed in Ohio at 20 per cent. better than last year. Some of our farmers in Highland have told me they counted on a yield of two bushels to the acre, which is worth, on an average, $4 per bushel. It is an article which is cultivated to a considerable extent in our county, and generally throughout the State.

Hemp and flax are articles that are not cultivated to much extent in Ohio. Whether the neglect of these articles is owing to the want of adaptation of our soil to their growth, I am not prepared to say. The amount of hemp raised in Highland county is small; and as I have no reliable means of knowing the quantity or quality raised, I must decline further particulars. Flax is more of an article of husbandry, and, to some extent, is raised by most of our farmers, and its growth is pretty well adapted to our soil. I have understood that some of our farmers have sown it in quantities for the seed, and cut it like wheat. Whether it is a profitable crop or not, I am unable to say. The past season, I think, was not a good one for either of the above articles.

Tobacco is not in much cultivation in Ohio, although I believe it

might be made a profitable crop. I know of but one cultivator who manufactures it to any extent, which is Mr. Carlyle, of Highland county. I am not sufficiently acquainted with his manner of cultivating and manufacturing to give a detailed account. His tobacco has a high character for being the best that is sold in our market. But of what quantity he manufactures annually, or what the difference is in the this year and last, I am not able to say.

Barley is not raised in any great quantity. Perhaps about an average crop this year with last.

Fruit of all kinds is fine and plenty, particularly apples. The crop of this fruit this year is at least 100 per cent. better than it has been for the last five years, and of a very fine quality.

Root crops of all kinds are very fine, except potatoes. This will not average with the last year by 10 per cent. Sweet potatoes about in the same proportion. Parsnips, beets, and carrots, are fine, on an average of 25 per cent. more than last year. There has been considerable complaint about the disease of the potato; more than last year, perhaps 10 per cent., which will make the crop short 20 per cent.

There seems to be considerable enterprise in raising stock, both in quality and quantity. Our cattle men are taking considerable pains to improve the stock of cattle in Ohio. The number of cattle in Ohio this year will perhaps amount to 25 per cent. more than last year. Hogs will perhaps average about with last year. The price of beef, on an average, about $3 50 per hundred, and pork about $3.

Sheep are about on an average with the past three or four years. In the eastern part of the State there are raised more for their fleeces than there are in the south or western part. Consequently there is more attention paid to the raising of them, and more regard to the quality of wool than there is in other parts of the State.

Butter and cheese are both manufactured according to the wants or demands at home, and will about average with the past year. But there is no country, perhaps, better calculated to make these articles to profit than Ohio, from the fact that our pastures are fine, and we can have as fine dairies as any set of people in the world; and there is nothing wanting but industry and enterprise for us to compete with Goshen, or any other county, in these two articles. Butter is, on an average, worth about 12½ cents per pound, and cheese from 6 to 8 cents.

Since we have got a statute law for the benefit of agriculture, a large number of the counties are availing themselves of the benefit of it—which is, that the amount which is subscribed by the agricultural society is to be equalled by the like amount paid by the county treasurer, which enables the societies to organize, and to prosecute their enterprise without much trouble.

E. BROWN.

Hon. Edmund Burke,
Commissioner of Patents.

TROY TOWNSHIP, RICHLAND COUNTY, OHIO.

DEAR SIR: Your "circular," calling for agricultural statistics for the year, A. D. 1848, was duly received, and would have been answered sooner had I not delayed to collect information from gentlemen whose business lay from home. It is only possible here to collect agricultural information by intercourse with intelligent farmers; consequently, after obtaining the best, our report must be imperfect. We have no agricultural society—no systematic farming, except what may be done by a few isolated individuals. Under such difficulties, you will readily see how imperfect must be our reports. I have done the best with the means at command.

Wheat.—For the reasons above assigned, it is impossible to give the amount of bushels, tons, &c., of any of our products. The wheat crop with us is not an average one; but we estimate a gain of 5 per cent. over the crop of 1847. The winters of 1846–'47 and 1847–'48, were open and rainy; that of the former, perhaps, the most so, attended with more sudden and violent freezings. The injury done by the fly was, perhaps, greater this year than last, and more general. Our best farmers prefer sowing from 10th to 5th of September; but we estimate the average, or most general, from the 15th of September to the 5th of October. Our time of harvest depends upon the season—sometimes earlier and sometimes later. Our best yield per acre is 35 to 45 bushels. The Club and Nova Scotia were, this year, most successful. The "early white" was almost a failure, being nearly destroyed by the fly. Some other kinds, the valley, river, and Mediterranean, being under test, did tolerably well. The "white blue stem" is coming into repute here. We find the yellow clay soil the surest and most productive in quality and quantity. The sandy or loose loam, however fertile, is liable to be severely affected by the rains and freezings. A snowy winter makes wheat. In the winter 1845–'46, the surface was covered nearly all the time with snows of various depths; hence the abundant, nay, superabundant crop of wheat harvested in 1846. I have been an inhabitant of a wheat country nearly all my life, and never knew a failure in wheat, the harvest succeeding an evenly winter with plenty of snow. But I have spoken of the fly. I had supposed at one time that I had found a remedy to destroy that "fell destroyer" of the wheat crop; but my sons, in applying the remedy in the fall of 1847, and not being successful, has caused some doubt. In the fall of 1840, I commenced and continued for three or four successive years, till the fly abated, with good success. The application of lime to the seed is the remedy.

Barley.—We estimate a loss of 20 per cent. on barley—less being sown and season too wet. It is an uncertain crop with us, and the price is so low as not to make it an object of attention.

Oats.—We estimate a gain of 8 per cent. on oats. The weather favorable for early sowing, and the season congenial to its growth; good in quality and quantity.

Rye.—This crop we suppose 3 per cent. short; season too wet at

filling time; not extensively cultivated; not very productive; price low.

Buckwheat.—Gain of 5 per cent.; season favorable; not extensively cultivated, being considered injurious to the land.

Indian corn.—Gain of 5 per cent.; season favorable. On the low or level lands, we had an abundant crop; but on the high or very hilly lands, the white or grub worm is said to have injured the crop very much. Some of my neighbors, with myself, have raised more per acre than we ever did in one season here.

Potatoes, common.—Similar to last year; season rather rainy; the common disease very prevalent; no remedy yet ascertained; much in demand at this time for consumption. I tried an experiment with lime, plaster, and ashes, putting the mixture first, and then dropping the potatoes on it, and covering with soil; but all of no avail. One of my neighbors delayed planting till about the middle of June. His crop was good, and very little injured by the disease.

Sweet potatoes are cultivated on a small scale here; but scarcely worthy of notice.

Hay.—Our grass, clover, and meadow, were excellent.

Hemp, flax, and tobacco.—Very little raised.

Cotton, rice, and silk.—None raised.

Sugar.—Not as extensively manufactured as formerly.

Cornstalk and straw fodder we do not use systematically, as is done in some parts, but conjecture the proportion of to grain, as set down in the circular.

Probable proportion of cultivated to uncultivated land, perhaps 66 per cent. Perhaps, reference being had to the annual report of the auditor of the State of Ohio, would be more satisfactory on this subject, and many others, than any other source with which I am acquainted at this time.

As to the balance of the "circular," there are several items on which I cannot say a word. No market; no demand of any consequence; prices so low that no attention is paid to culture. It is a lamentable fact that nothing, except wheat, clover, timothy, and flaxseed, bear transportation; consequently, little atttention is paid to anything more than a bare supply of home consumption. Live hogs were currently sold and bought last summer at $1 50 per cwt. Many of our farmers have resolved to raise no more than a bare supply for their own families. It would afford me the greatest pleasure to give you a more perfect account of our agricultural affairs, but I cannot.

I should be more than wanting in common courtesy not to acknowledge my highest respects for the favor of your agricultural report for the year 1847, duly received, and also the honor conferred on me, and the confidence reposed in me, by again forwarding your "circular" to me, who can can so illy repay such high considerations. I shall be happy, at any time, to contribute in any way that my feeble efforts may be available.

I would gladly send you some specimens of seeds, did I know

how to convey them with safety. I inquired last fall of several gentlemen who I thought could inform, but they could not.

With high considerations of respect, I remain yours, &c.,

JAS. D. SUMMERS.

Hon. Edmund Burke.

Laporte, Indiana, *November* 6, 1848.

Dear Sir: In accordance with your request, I have the honor herewith to transmit a partial answer to the questions forwarded to me in your circular.

I am unable to answer but few of the questions you desire, but I will endeavor to give you such information of this section of country as I am able to do.

Laporte is the most northwest county of the State, bordering on Lake Michigan. Michigan City is our seaport, and Laporte is the county seat, located on a prairie called Door Prairie. We have good water, first rate timber of every variety, from the scrubby beaver oak to the lofty pine. We have no good stone, but we have clay that makes a good article of brick. We have many small lakes, the waters of which are as pure and as limpid as the waters of Lake Erie or Michigan. Our town, Laporte, is situated on one of them. We are in a high altitude, where we can see waters flow to the Gulf of Mexico, and at the same time see others flow that fall into the Gulf of St. Lawrence. Consequently we have a good country for sheep, which do well here; they are as healthy here as in any country I ever knew. There is more attention paid to wool growing than heretofore.

Wheat is the staple product of the county, yet there is a large quantity of corn raised and some hogs fattened for the eastern market. Wheat is sown in September, from the first to the last of the month, and many have sown as late as the middle of October, on account of fear of the fly, which had done much damage last year, and, on the whole, we had rather a light crop. The fly did much damage in many places, and then we had a very unfavorable time for harvesting our crops, grass as well as grain.

Wheat suffered very much by the wet season; most of the wheat was injured. It grew standing, and if the rains had continued many days more, we should have lost our entire crop; but, fortunately, the weather cleared away, and we had some eight or nine days' good weather, when we had a return of the rain. However, most of the crop was cut and in shock, and some drawn in, but the greater proportion was out. At this time the rains did not continue so incessantly as before, so that the wheat was got in between showers, but generally in a bad condition. Good wheat has brought this fall something like from 75 to 95 cents. Corn was worth this summer, at Michigan City, from 25 to 37½ cents.

We have this year a new wheat drill introduced among us, which promises well. It comes to us highly recommended by those who have used it. It is the Gatling drill, patented, I believe, in 1845.

We have had a bad season to test them, as it has been so very wet; the land should be dry and in good condition to have them work well.

Our corn crop is good this year—over an average crop.

The oat crop is rather light; 20 to 25 bushels of wheat, with good cultivation, may be considered an average crop, although we sometimes raise much more. I have raised 50 bushels to the acre, which was an average of the field; 40 to 50 bushels of corn may be considered an average to the acre when under good cultivation; much more, however, has been raised. It is not uncommon for corn to yield 75 to 80 bushels, and sometimes 100 and over, under very high cultivation; 50 bushels of oats to the acre is considered a good yield, yet we sometimes get 75 to 80.

We have heretofore raised the best kind of potatoes; but we, like poor Ireland, have suffered with the rot, which first made its appearance among us last year. We lost more than one-half the crop. This year we are still worse off; I think we have lost three-fourths of the crop, if not more. About the last week in July they commenced to rot, and continued for about three weeks. All this time we had a very humid atmosphere, when the weather cleared away and the rot ceased. Since then I have not discovered any attacks of the rot.

Iron ore is found in great abundance in this vicinity. We have had an extensive steam furnace erected in Laporte this season. The iron is said to be of the best quality.

I have omitted to give you the per cent. of increase or decrease of our wheat crop. I can only say that our wheat was literally destroyed last winter by being winter killed, a thing that never happened to us before, as our soil is not of that character to heave and freeze out the wheat crop. It did not at this time heave; the way I account for it is this: the earth was hard frozen when the snow fell, and in the month of January we had a thaw and heavy rain, which thawed the ground about half out, when it turned cold very sudden, freezing the earth very hard, and when the spring opened we found our wheat was killed. I think the freeze so completely closed the pores of the earth when it was so full of water, that it excluded the air entirely. Vegetable life as well as animal must have air, and being deprived of it by this means I consider the cause of the failure.

Yours, most respectfully,

B. M. NEWKIRK.

Hon. Edmund Burke,
Commissioner of Patents.

I forgot to say anything about our harvesting machines, so I will attach this in the proper place. A considerable portion of the wheat and oat crop have been harvested by or cut by machines propelled by horse power. Quite a number of the McCormack machines have been put in operation this season. I cut my wheat and oats with a Woodward machine, patented in 1845, a model of which you of course have; the principle of which I like much bet-

ter than any I have yet seen. I think it is destined to be improved upon, and made to do our harvesting much better and faster, and also much cheaper, than to cut with cradles by hand.

HENNEPIN, *November* 17, 1848.

SIR: I have, with the assistance of Williamson Durley, esq., to whom the enclosed circular of queries was addressed, endeavored to answer the interrogations therein contained, and now transmit it to you.

The estimates are founded, in part, on the census of the county, (in 1845,) in my office, and partly on the computations of citizens of the county, whose means of knowing are very good; so that I think it is *tolerably* correct, at least. The county, viz: Putnam county, Illinois, contains about $4\frac{1}{6}$ townships of six miles square, or 96,000 acres of land. As to the quantity of land in cultivation, it is hard to form any correct idea. The most persons with whom I spoke about it, seemed to think about one-fifteenth part; and some even went as high as one-twenty-fifth part. I have set it down at one-tenth part, as the nearest approximation to the correct quantity, but do not pretend to know.

The crops have increased greatly in quantity since last year, except the potato crop, which, I think, is not so large, owing to the effects of the potato rot, which has reduced the quantity one-fifth, perhaps, although there was more planted this season than last.

The potato crop of last year, I should think, averaged near 150 bushels to the acre, while that of this year will not average more than 100 bushels to the acre.

There has been a favorable change, lately, in the minds of the people in regard to the cultivation of fruit. There is beginning to be considerable attention paid to this important part of agriculture lately; so that we have now several very good orchards in the county, and a good many others in fair progress.

Apples do very well. Peaches do not do quite so well, on account of being cut off about every other season by the late frosts, &c. The weather during the planting season was tolerable cool, with frequent rains, and on the whole was more favorable this season than it was last season, or has been commonly; was warmer while growing and at harvest. The potato rot is the only disease which has affected the crops this year. The probable per centage of loss by it has been given.

Wheat is principally sown on corn ground, at a cost which I estimate at $4 per acre, as follows:

For putting in (per acre)	$0 50
For seed, "	1 00
For cutting, "	1 00
For threshing, "	1 50
	4 00

Sod wheat has generally been the best, except in '42, when it failed. Wheat does very well, though, in corn ground. The cost of raising sod wheat I estimate as follows:

For breaking ground (per acre)			$1 50
For seed,	"		1 00
For harrowing in,	"		0 50
For cutting,	"		1 00
For threshing,	"		1 50
			5 50

Oats are sowed principally after corn, at a cost, as near as I can estimate, about 50 cents per acre for ploughing ground; 50 cents per acre for harrowing in; 30 cents per acre for seed; $1 per acre for cutting and binding; and $2 per acre for threshing and cleaning; making a cost, in all, of about $4 30 per acre.

Wheat and oats are commonly threshed in the field; sometimes without having been stacked or put into a barn.

Potatoes yield well on any kind of land—wheat or corn stubble.

The cost of raising potatoes, &c., is about the same as corn, except the digging, which costs more.

The probable average consumption per individual, of wheat, &c., I cannot estimate with any degree of certainty, but suppose it to be near 10 bushels of wheat, 2 bushels of corn, 5 bushels of potatoes, and 200 pounds of beef and pork to the individual.

I have now answered all the interrogations contained in the circular to the best of my abilities. I regret that I have not the means in my power of doing it more satisfactorily to myself, and more certainly for you.

I have already extended this communication longer than you will perhaps desire to read, but you can probably glean something from it which will enable you with more certainty to calculate, in regard to the correctness of the answers given.

I should be very happy to communicate anything which lay in my power, which might tend to facilitate you in making calculations to be embodied in the able report which annually emanates from your office, or add to the interest of such report.

I am, sir, with much respect, your most obedient servant,

GEO. DENT.

Hon. Edmund Burke,
Commissioner of Patents.

Arensville, Cass County, Illinois,
December 13, 1848.

Sir: Your circulars, calling for agricultural statistics for the year 1848, would have received an earlier answer; but not being able to furnish the desired information in the manner requested, I endea-

vored to get some one more able than myself to form the estimates and transmit the replies, without success.

There are no agricultural societies or farmers' clubs in this or adjoining counties—nor has the county assessor taken any trouble to obtain information, (which I hope will be hereafter;) my personal observation and experience admit of a brief reply only. Last winter was a mild one; the season for planting in the spring favorable; the balance of the year up to this time rather wet, and less heat during summer than usual.

The *wheat* harvest produced one-fourth more than the preceding year.

Corn stood very well, but produces less, say 20.7 per acre; the quantity planted exceeds that of any former season, and the aggregate product will not be less than in 1847.

Oats, *rye*, *barley* and *buckwheat* are not extensively cultivated, though the yield of each kind is equal to any former year.

Potatoes suffered in places by rot; nevertheless, the crop is an average one.

The *hay* crop was large—the quality indifferent, in consequence of the wet season, the grasses having lodged, and not well cured.

The product of the *orchard* generally good, except peaches and grapes, the latter being affected with the rot.

There is an advance in the raising of stock, especially cattle and hogs. Indian corn cannot be raised here for less than 9 cents per bushel and delivered in the crib on the plantation; and, in my opinion, such will be found to be the average expense in the corn growing States of the west. The consumption of Indian corn for hogs, during the twelvemonth preceding to being killed, may be set down at twenty bushels per head, which will greatly increase the home consumption, as estimated by you in the report of 1847.

Wages of female help, (domestics—a name not popular here,) from five to eight dollars per month; mechanics receive from $1 to $1 50 per day, and boarding.

Below, you find a table of exports during the year ending the 1st December. Beardstown is the only point on the Illinois river in Cass county; and the produce exported, with the exception of pork, is raised in Cass county. Hogs are brought to this point from the adjoining counties, and the large quantity killed and contracted for this season over last is not altogether owing to an increase, which is estimated at about 10 per cent.; the demand here and facilities for packing this winter is the main cause. The price for hogs is $2 50 per 100 pounds, net; a few days ago, one lot of 100 head, averaged 320 pounds, net, per head; this lot is rather superior. The entire average of all the hogs killed during the season may be set down at 230 pounds.

Respectfully, your obedient servant,

F. AREN.

Hon. Edmund Burke.

Exports of grain at Beardstown, from the 1st December, 1847, to 1st December, 1848: Wheat, 100,000 bushels, average price 65

cents per bushel; Indian corn, 150,000 bushels, averaged 25 cents per bushel.

The number of hogs killed for export last year, 28,000; this year killed and contracted for to be killed, 55,000.

The grain exported is the product of Cass county. The population amounts to about 6,500; the area of the county is equal to 396 square miles, not more than a quarter of which is in cultivation.

The export of other grain, potatoes, and the product of the dairy, is considerable; and the fattening of steers, which are sold to drovers, and carried south and east, form a considerable item of the farming operation of the county.

MENDON, ADAMS COUNTY, ILLINOIS,
January 10, 1849.

DEAR SIR: A copy of your reports for 1847 has been placed in my hands, and although a borrowed one, I can safely say that I have not perused a volume with more satisfaction for a twelvemonth than the one last issued from your office.

The wheat crop of 1848 was not as good as that of 1847; and besides, it was considerably injured by heavy rains soon after harvest. From the 10th of August to September, we had a perfect deluge of water; it was difficult to get a wagon or horses into the harvest field, the ground was so soft; and before we could get a stack built it was very likely to be pickled down with rain water. Thousands of bushels were entirely lost in the shock as it stood in the field. Many stacks were ruined by being put up in an imperfect manner, and some lost after it was threshed out. The consequences are easily foreseen, that a large quantity of the flour which will be sent into market will be mixed with the flour made from grown grain, which may possibly affect the market for the next season; at the same time, the flour which is then sent into market may be manufactured from better grain, and not injured by the wet weather in the least. We can raise as good wheat in northern and central Illinois as they can in western New York, when we once conform to their tillage system. Good prairie, broken in the month of June, cross-ploughed and sown by the 12th of September, will produce 25 bushels of wheat to the acre, and a pretty sure crop at that. This is our first and best method of raising wheat. Our next plan is to put the land in corn, and in the month of September or October we sow wheat in the corn, and run a plough through the corn in the same manner of ploughing corn. This a very cheap way of raising a wheat crop, and we get from 10 to 15 bushels per acre. The third way is to turn the stubble under in August or September, (wheat or oat stubble,) sow on the seed, and run over it twice or three times, and our wheat crop is sown. By this method we usually get from 10 to 20 bushels to the acre.

Our corn crops we manage in a little better way. If the corn crops follows wheat, it is a most excellent method to turn the stubble under in the fall; all that is necessary in the spring is to give

it a good harrowing, lay off the corn road, and plant the seed. In 1847, by this method of cultivating, I raised 87 bushels to the acre, with no other tending than what a good horse and plough could give it.

I am told by eastern people that western pork and lard do not bring as good prices in their markets by about one-third or one-half as the pork and lard which is fatted at the east. For some time I was sorely puzzled to solve the query, for I well knew that we certainly had as good a breed of hogs, and that I could discover nothing inferior in the quality of our corn. At last I came to the conclusion that the fault was in neither, but that a large portion of the pork fatted at the west is, in reality, *mast fed pork.* A little corn may be given to the hogs for a month or two before killing time—just enough to call it corn fed pork. Again, distilleries are rising up on every side, and thousands and tens of thousands of hogs are fatted on still slops, and sent into market and sold somewhere and to somebody. And yet again, in a grain growing country like ours we must have mills to grind it, and no miller can make 60 pounds of superfine flour from 60 pounds of wheat; there will, of course, be some bran, shorts, &c. Now, where mills are driven by steam power, the expense of fitting up a steam box and running a small pipe from the boiler into it, is comparatively nothing; and then they have an excellent place for cooking the bran, shorts and middlings into food for hogs, and once a year a steam mill can turn out a large number of bran-mash pork hogs.

There is no part of our proud and happy republic that can produce better or fairer fruit, especially apples, than central Illinois. I have walked through orchards the last fall, 1848, where were hundreds of bushels of luscious apples; and I searched, but in vain, for one defective or wormy apple. It could not be found. All were fair and suitable for market; and although large quantities were raised in our county, all found a ready market at from 50 to 75 cents per bushel, and at this time none are to be had in the market. There is probably no food more natural to mankind than a good ripe apple. It is anti-dyspeptic and anti-bilious; and if the people in this great valley of the west would eat less corn bread and bacon, and drink less strong coffee and whiskey, and eat more of those rich, juicy apples, cooked or uncooked, we should see, hear and feel less of those bilious complaints, fevers, agues and chills, which every one is more or less subject to every season.

Every young farmer can very easily start an orchard, and at a trifling expense. If he only has the will, he may be sure to find the way. Good grafted fruit trees of three or four years old can be had at our nurseries in any quantity for a picayune or a bit a piece; or if he does not feel able or willing to be at that expense, he can follow my plan of starting an orchard. In the spring of 1839 I bought 100 seedling apple trees for $8, and paid in work. I planted them out in my garden in rows four feet apart, that I might run a plough between them, and at five feet apart in the rows, and kept them well cultivated that season.

In the spring of 1840, in the early part of March, I procured

from the best orchard I could find (John Woods, esquire, Quincy) two or three large bundles of scions, cut from horizontal branches of the last year's growth. These I buried in my garden three inches under ground till I should want them. When the season was so far advanced that the buds on the trees began to crack open and the small leaves to appear, I dug a trench along each line of apple trees about six inches deep and about the same width. I then bent down an apple tree, and, with a fork stick drove into the ground, held it there firmly; then, with a sharp pointed strong knife and a hammer, I commenced grafting. First, I drove the knife through the tree at the root, and made a cleft large enough to insert my scion. I then with a sharp knife cut my scion about six inches long, sharpened the lower end to a wedge-like form, drove it into the cleft until the bark on the scion just met the bark on the tree; pulled out my large knife; the split in the tree of course closed up and held my scion fast. In five or six inches I stuck in another, and continued on so until I came to the top of the tree. I then filled up the trench with fine loose soil, tramping it down with my feet, leaving only the upper bud out of the earth. The top of the tree I covered up in the same way, leaving the ends of the twigs just out of the ground. In this way I treated my 100 apple trees, and in two days' time I had finished them. I would remark that the trees were about 1½ inches in diameter, and very thrifty. The scions grew astonishingly well. Of about 800 scions set, all grew but about 20; and in two years the scions had formed roots of their own, so that when I took them up I broke off the old stalk and threw it away, and each twig of the top grew and formed roots of its own. Thus, by a little industry and management, I made 200 good grafted trees for my own use, now bearing trees, and sold 1,000 trees, some for 6 to the dollar and some at 8 to the dollar.

Very truly, yours,

TIMOTHY DUDLEY.

Hon. EDMUND BURKE,
Commissioner of Patents,
Washington city, *D. C.*

LA SALLE, MONROE CO., MICHIGAN,
November 20, 1848.

I herewith return your "circular," with such returns as I have been able to gather during the limited time it has been before me; for, by some fatality, it did not reach me until late in *October*.

The results of the wheat crop (our staple) for the current year, are very conflicting. Where the old varieties were sown, the insect (Hessian fly) injured it very much. Where the Mediterranean blue stem, Etrurian, and Virginia May (to us new varieties) were sown the crop was very fine, and yielded abundant.

The Mediterranean, with me, averaged 27½ bushels per acre;

while the old varieties, "Hutchinson and red chaff bald" did not reach quite 10 bushels per acre, with the same soil and tillage; in fact, in the same field.

I find the cost of raising my wheat crop this year, to wit., 24 2 10th cents per bushel, falls below the average given in my statement last year. I sold crops in October for $1 03 and $1 06.

The greater portion of my wheat was sown after barley. The growth of straw after this crop appears to be less than any other I have yet tried as a fore crop. Even lands hitherto deemed too rich for wheat, succeed well, treated in this manner. The growing wheat stands up well, and ripens without rust. Will this mode of culture admit of general practice? If so, its economy is apparent; for it is obvious that, on all well improved lands, the tedious, expensive, and (to the soil) injurious process of summer fallowing may be dispensed with; and, in its stead, with the same labor, nearly, and in the same time occupied in fallowing, a remunerating crop may be raised and marketed, before the ordinary sowing season arrives, whose profit will more than repay the preparatory expense of the ensuing wheat crop. Nor does the process interfere in any way with the proper rotation of crops; for barley succeeds equally well with me on clover lea, old pasture, or corn stubble with *fall* ploughing; which is, after all, in my estimation, the true mode of *fallowing*.

Respectfully, your obedient servant,

S. M. BARTLETT.

Hon. Edmund Burke,
Commissioner of Patents.

Plymouth, Wayne Co. Michigan,
November 22, 1848.

In answer to your letter requesting the comparative amounts of increase or decrease of the crops of this current year, as compared with those of the year 1847, together with other information relating to the condition of Michigan, it may be proper here to state, that, from the best information derived by observation, and from the practical cultivators of the soil, some portions of the State have been more highly favored than others in crops. In the counties of Oakland, Macomb, Lapeer, Genesee, from good authority, it is stated that there has been harvested from 20 to 30 bushels per acre in this region.

In the counties of Wayne, Washtenaw, and Monroe, the crop has fallen one-third from former years in amount. In the counties of Ingham, Eaton, Clinton, Ionia, Kent, Livingston, and Shiawassee, the crops have been good, with an increase of acres above the previous year. In the counties of Jackson, Calhoun, Kalamazoo, Branch, St. Josephs, Cass, Lenawee, Hillsdale, Allegan, Van Buren, Barry, and Berrien, the crop will exceed the crop of the former year, although the early sowed wheat has suffered loss by the insect; while that sowed after the 15th of September

has produced a good yield. Therefore, taking the crop of the whole State, with the progression of improvement, the amount must exceed that of 1847.

The corn and oat crops of the current year are also estimated to exceed those of 1847, owing to an increase of acres.

The potato crop is short. The vines suffered by the wet weather, and on the *clay soils* there has been a failure. On the *sandy loams* and *clover lays* the crop is good.

The above named crops compose the staple of Michigan; the root crops are generally abundant.

The cost of raising the before named crops:

Wheat crop.—The price of land, and interest of money, at six per cent., is estimated, according to the present tedious mode of cultivation, as follows:

1. Price of land, at $10 per acre, for two years, $20........	$1 20
2. The cost of ploughing, sowing, and harvesting, counting the cost of labor of man and team, wear and tear, of tools and board, cannot be less than $4 this year........	4 00
3. The cost of seed, 1½ bushels per acre	1 20
4. The cost of harvesting, "	1 50
5. Threshing and cleaning, "	1 50
	9 40

Cost of raising per bushel, 52 9 20th cents.

Average crop this year, 18 bushels—$13 50, at 75 cents per bushel.
9 40
—— $4 10 profit.

Corn crop.—

Interest on land, at 6 per cent. per acre..................	$0 60
Ploughing and harrowing, "	1 50
Furrowing, planting, seed, and plaster....................	1 50
Cultivating, harrowing, ploughing, and hoeing.............	2 00
Harvesting and shelling, and securing the fodder..........	2 25
	7 85

Cost of raising, 19 6 10th cents per bushel.

Average crop, 40 bushels per acre—$12 00, at 30 cents per bushel.
7 85
—— $4 15 profit.

Oat crop.—

Interest, at 6 per cent., on land..........................	$0 60
Ploughing land, per acre....................................	1 50
Seed, two bushels per acre..................................	0 50

Sowing and harrowing	1 50
Harvesting and threshing	2 00
	6 10

Cost per bushel, 15 4 10th cents.
Average crop, 40 bushels, at
22
—— $4 80   22 cents per bushel—$8 80
6 10

2 70 profit.

The amount of fodder from the above crops forms quite a profitable item to the farmer in this State, for food and litter for his stock, and adds to the manure.

Estimating the State to contain 400,000 inhabitants, and that each individual consumes on the average eight bushels of wheat, the amount consumed will be 3,200,000 bushels. The consumption of corn for breadstuff in Michigan does not amount to much, as the people make use of wheat flour for their breadstuff generally.

Notwithstanding this large consumption, added to the vast amount of seed annually sown, some 4,000,000 of bushels find their way to the eastern markets. Together with this surplus may be added a surplus of wool, pork, butter and corn, so that the young State of Michigan begins to realize the balance of trade in her favor.

It may not be out of place here to quote a few words from the reports of an able geological and topographical survey of the revered Houghton, Michigan: "The large rivers and infinity of small interior lakes give the utmost facilities to internal navigation; add to this the superior quality of the soil, its easy tillage, the heavy and abundant crops, and perhaps the whole is not surpassed by any section of equal extent on the surface of the globe."

	The amount of rain.	The maximum temperature.
Rain in May 5	865	79 deg. 64 min.
" June 2	528	89 " 52 "
" July 11	380	82 " 56 "
" August 7	369	86 " 60 "
" September 7	216	79 " 38 "
" October 4	216	69 " 33 "

For the above table we are indebted to the Rev. Dr. Duffield, of Detroit, through the politeness of Dr. W. W. Markham, and it shows an uncommon amount of rain.

The rain commenced on the 4th day of July, and, as you see, we have had a wet harvest and seeding time; the planting season in the spring was fair. Since 1836, we have had no season half so wet as this, and even that season was not so wet. The interesting

reflections arising from facts of a similar character, in the natural world, are admirably adapted to that class of contemplation which teaches that all flesh is but grass, compared with the power that established the foundation of the universe, and marshalled the heavenly hosts, and which instituted those unerring laws to govern the whole.

As for the climate of Michigan, it is generally salubrious; as the great lakes wash three sides of the State, her climate is uncommonly mild for the latitude she occupies. The face of the State is, on the whole, gently rolling, and her soil well mixed with phosphate of lime, salt of nitre, potash, and alluvial matter.

The soil brought from the deep wells, in various regions of the State, will grow vegetables luxuriantly, and even trees have been found to great depths in the earth among the highest hills in the State. More might be said touching this interesting subject, but time and space will not permit.

A new mode of cultivation is about taking the place of the old soil destroying system, viz: to plough but once for a crop, roll down the turf, and then let it remain for decomposition—cultivate the surface to keep down weeds and grass. For this process, N. Ides's wheel cultivator is the thing itself; it does up the work most admirably, and for the next crop this turf forms a fertilizer, while the surface with the vegetable matter is turned under to form another by the process of decomposition; the soil having been rolled down in a compact state, not much is lost by evaporation. The ploughing should be graduated in proportion to the variety of *soils* and proportion of *heat*—so far as the heat penetrates the surface, the *tendency* is *upward*. In sustaining and supporting vegetable life, as for the rolling process, every farmer knows where he turns his teams there he has the best crop; and when he looks on the forest, and beholds the majestic pine penetrating the clouds, and by its side the sturdy oak. defying the tempest, how is it that they have attained this mighty grandeur without cultivation? The fact is, that the earth has suffered no loss by evaporation.

A few words in continuation of this new mode of cultivating the soil. It is matter of history in some of our older States, and in many portions of the old world, that, where thousands of our *race*, through a mistaken zeal for gain, have followed the soil destroying system, so styled, by exposing it to the atmosphere, so that its best properties have passed off in the *vapor*, this process has been going on from generation to generation, until those lands have been exhausted and abandoned; and, in the final destruction, the misguided cultivators have met the common fate of exhausted energies, while in those old regions, where the cultivators of the soil have been governed by the common sense principle of preserving the soil and its properties, it improves by cultivation. In some parts of Germany, where the soil has been under cultivation for two thousand years, it is far better now than when first commenced. All of which is submitted to your consideration; and anything in

my power which may be given, that may add to the very useful reports of your office, will be most cheerfully granted.

With the highest esteem, truly, your friend,

JONATHAN SHEAVER.

Hon. EDMUND BURKE,
Commissioner of Patents.

FALLS OF ST. CROIX,
St. Croix county, Wisconsin, October 26, 1848.

SIR: Your circular of this year reached me some time since. I have delayed answering for some time, to enable me to collect what little information the means at my command would enable me to do so.

I find that all the crops of various kinds raised in this section will exceed by fifty per cent. the amount raised last year. The season has been generally good, though a late frost in the fore part of the month of June somewhat injured a few fields of corn; but, notwithstanding, it has been as a general thing more than an average crop.

This section of country is fast improving; it is but just commencing, I may say, to settle. This year was our first land sale. This will have a tendency to make the settlement more permanent, and steady in its advance. Many people, I find, have been of the opinion heretofore that we were so far north that some of the small grains could not be raised; but as the country becomes more known, those opinions will be exploded. Immigration is now beginning to flow in, more extended farms to be opened, and the capabilities of the country for agricultural purposes more fully developed.

The farmers in this section have a most excellent home market. Being in the vicinity of immense pine forests, the supply will not equal the demand for a long time, if ever; as, when the pine is exhausted, I am of the opinion that mineral will be found; so you see that our distance from the eastern market is a benefit rather than a detriment.

We have not yet formed any agricultural societies. Neither blight or insects have yet disturbed any of our crops, except potatoes; they have this year been visited by the rot to considerable extent in some fields, while in others they were not affected; but no person can pretend to account for the cause; one thing appears to affect them in one place, and in another it apparently has directly the contrary effect, and by all I can learn, either from your reports or from various periodicals, it is the same all over the country.

Lumbering is our principal business. There has this year been sent out of this river (the St. Croix) twelve millions of sawed lumber, worth, at the mills, ten dollars per thousand feet, making a total of one hundred and twenty thousand dollars; also two mil-

lions feet of saw-logs, worth here $5 per thousand, making a total of $10,000. Considerable has heretofore been done in the fur trade; but as other interests increase, that is diminishing. White people are crowding the Indians back, and the fur bearing animals are also diminishing in numbers.

This must soon be a fine grazing country. Our winters mild, store cattle as yet require no foddering, but will live and increase in flesh on the extensive beds of rushes that abound in the country; but as it fills up they will gradually disappear, as they do not grow fast. More hay will then be required; but any quantity of the wild kinds can be had for $3 per ton. I am of the opinion that when well cured and in season, it is two-thirds as nutritious as the best varieties of tame hay.

I hope ere many years to be able to give a more full and flattering account of the agricultural interests of this country. The seeds which were sent me last spring from your office were thankfully received; but sufficient time has not yet been had to test the value of them; it will at least require two years to get them fairly acclimated.

The Patent Office report which I received lately is a valuable work. If more of them could be distributed in the country, they would be of great service, and, I think, would be a great means of inducing the farmers to enter more scientifically into their business; that, in my opinion, would be the best way of distributing a portion of the proceeds of the sales of public lands; let the people have light, and they will improve by it, and eventually build their own railroads, canals, and harbors, without any assistance from the general government.

Accompanying this I send you a small sample of the wild rice which abounds in this country. I am in hopes some of the grains will be whole when you receive it; but it is so hard and brittle that it is somewhat doubtful. The Indians gather large quantities of it; their method of doing which is, they pass through amongst it with their canoes before it gets quite ripe and collect the heads together in a handful, and give them a twist, so that they will stay together; this prevents them falling down into the water. When quite ripe, they again pass along in their canoes and bend these clusters of heads over into them, and with a small stick beat out the grains. In this manner two of them will collect three or four bushels in a day. Their methods of using it are either to parch it over a slow fire, and then mix it with a little sugar, and in that manner eat it; or to boil it and mix a little grease with it, if they have any, or if not, to eat without anything to make it relish. White men have frequently lived on it in that manner for several days, and found it very nourishing. We use a great deal of it in the same way as the southern rice is used, and find it quite as palatable, and I believe much more nutritious. I have thought sometimes it might be cultivated to great extent, and made an article of commerce. The Indians frequently sow it when they find a good place for it, if it is not already growing spontaneously.

All matters from your office will be at all times thankfully received.

I have the honor to be, sir, your obedient servant,

JOSEPH BONSON.

Hon. Edmund Burke,
Commissioner of Patents.

New London, Henry Co., Iowa,
October 29, 1848.

Dear Sir: Your circular asking for information was duly received. I should have replied sooner, but I waited to collect what information lay within my reach on what I consider a very important subject. After all, I have to regret the small amount of information which I can send you. The county is as yet too new to collect any statistics of the aggregate of the different crops which can be relied on. But I will begin with them in the order in which they are placed in your circular.

Wheat.—There was probably more sown last fall than in the fall of 1846, but it was very badly winter killed, and the rust injured the remainder, so that there is very little prime winter wheat. I shall set down winter wheat at 10 per cent. less than in 1847, but from the winter wheat coming in short, there was more spring wheat sown, of which there were good crops. And taking the two together, I think I may set down an increase of 10 per cent.

Barley.—There was very little raised here. The crop was rather light, owing to the dry weather in May. I shall set it down at a decrease of 5 per cent. Average per acre, 15 bushels.

Oats.—The season was very favorable for this crop, which, with greater breadth sown, increased the aggregate about 20 per cent. They are used principally for feeding stock at home. Average per acre, 35 bushels.

Rye.—There is not enough of this grain raised to furnish data on which to form an estimate. The cause I shall put at the low price and small yield.

Buckwheat.—This is raised generally over the country in small parcels for domestic use. The warm weather in August and September forced the sap into the straw so long, that it left no time for the grain to mature before frost, which made the crop very light, say 8 bushels per acre, and a decrease of 25 per cent.

Indian corn.—This is truly the great staple of the west, and is constantly increasing. The weather this year was very favorable for the growth of the stalk, but the drought at the time it was shooting for ear caused the ears to be rather light. The crop in 1847 was uncommonly heavy, and I think there is a falling off 12 or 15 per cent. per acre. But there was a large increase in the ground devoted to this crop. So I think there is an increase of the aggregate of about 33 per cent. Produce per acre, 40 bushels.

Potatoes are cultivated here almost expressly for the table, as the ease with which grain is raised renders it much cheaper food

for stock than potatoes, which causes them to be planted in small pieces. And it is very uncommon to see an acre of them in one piece. The rot or plague has never spread in this section of country before this year, when it appeared very unexpectedly, so much so that but very few experiments were tried to prevent it. Those which were planted very early escaped almost entirely, while those which were planted late in the season, were, in some cases, not worth digging, and, almost without an exception, very much injured. The loss was probably full 50 per cent.

Hay.—This was somewhat light in consequence of the drought in the early part of the season. But still a very fair crop, say 1½ tons per acre is realized. And as meadows are constantly increasing, there was a gain of about 10 per cent. The best meadow has proved to be herds grass and clover mixed at the rate of four quarts herds grass to four quarts of clover per acre.

Orchard.—There is a continued increase of attention, and orchards are constantly being planted, although there are very few apples raised here yet, owing to the newness of the country. But what few orchards are old enough bear very fine fruit. Peaches are a very uncertain crop, owing to the severe winters. But this year there was a tolerable supply raised, which sold readily at 75 cents per bushel; apples $1 to $1 25 per bushel.

Stock of all kinds are constantly increasing, and this is to be eventually one of the greatest stock raising countries in the world. I think we may safely put down the increase of all kinds at 15 per cent. There are many of our largest farmers turning their attention more to sheep on account of the ease with which wool is transported to the eastern market, as all our produce has to find its way to the southern and eastern markets. There are some large flocks of Merino and Saxony sheep here which are doing well. There is a considerable amount of wool annually exported to Boston and Philapelphia, which nets the owner 20 to 35 per cents per pound, according to the quality. I shall set the increase of sheep and wool at 20 per cent.

Hogs.—The increase of corn has brought a corresponding increase of hogs, which I think may be set down at 25 per cent. Their average weight when slaughtered, 250 pounds. Price $1 75 to $2 per hundred pounds.

Wages of labor as follows: farm laborers in the summer $8 to $12 per month, or 50 cents per day. In harvest $15 per month, or $1 per day. In winter $6 to $10 per month. Mechanics $1 per day, or $15 to $20 per month. Female domestics from $1 to $1 50 per week. The proportion of cultivated to uncultivated land is hard to form an estimate of. But including timber land as uncultivated, there is not, probably, more than 8 or 10 per cent. of cultivated land. But that amount is rapidly increasing. And should the Osage orange come up to the expectation of many who are now trying it for hedging, our large prairies will soon be turned into fine farms.

I very much regret the small amount of information I am able to furnish you, but in the unsettled state of a new country, statis-

tics cannot be collected with the same ease or certainty as in the older States.

Cost of raising wheat.

Breaking up sod or prairies $2 per acre	$2 00
$1\frac{1}{2}$ bushels of seed at 60 cents per bushel	0 90
Harrowing	1 00
Cutting, binding, &c.	1 00
Threshing and cleaning, &c., 7 cents per bushel	1 05
Transporting to market $6\frac{1}{4}$ cents	0 94
Total cost of 15 bushels	$6 89
Amount of 15 bushels at 60 cents per bushel	9 00
Net gain	$2 15
Cost per bushel for raising	0 41
Gain per bushel	0 15

Cost of Corn per acre.

Ploughing $62\frac{1}{2}$ cents	$0 $62\frac{1}{2}$
Marking off and planting	0 50
Cultivating	1 00
Harvesting	0 75
Total cost	$2 $87\frac{1}{2}$
Amount, 40 bushels, $12\frac{1}{2}$ cents per bushel	4 20
Net gain per acre	1 $33\frac{1}{2}$
Cost per bushel 7 cents	0 07
Net profit per bushel	0 $05\frac{1}{2}$

JOHN BANGS, Jr.

Hon. Edmund Burke.
Commissioner of Patents.

State of Iowa, Lee County, Fort Madison,
November 10, 1848.

Sir: I have herein sent you an answer to some of the queries sent to Mr. O'Neil of this county.

1st. Names and date of formation of county, or township, agricultural society, or farmers' club, &c.?

Answer. None in the county.

2d. Number of members, &c.?

None.

3d. Names and date of formation, &c.?

None.

4th. State of the weather at the planting season, while growing,

and at harvest; and, when practicable, the mean temperature of the months, and the amount of rain which fell?

Answer, as follows: From 5th of March, 1848, monthly mean, 44°.98; five days entirely clear; two days entirely cloudy; snow, 7th; rain, 11th, 19th, 20th, 21st, 22d, 25th; sowed spring wheat, 28th, 29th, 30th; coldest day, 5th, 9°.33; warmest day, 30th, 70°.33.

April; monthly mean, 53°.35; four days entirely clear; two days entirely cloudy; rain, 2d, 3d, 17th, 22d, 28th days; planting season, from 24th to 10th May—seasonable and pleasant; coolest day, 4th, 39°.66; warmest, 9th, 67°.

May; monthly mean, 68°.24; five days entirely clear; four entirely cloudy; rain, 1st, 3d, 7th, 10th, 15th, 18th, 20th, 22d, 23d, and 28th—seasonable and pleasant; coolest day, 10th, 50°.33; warmest day, 21st, 77°.66. Amount of rain this month 4.67 inch.

June; monthly mean, 72°.89; eight days entirely clear; two entirely cloudy; rain, 2d, 3d, 8th, 18th, 19th, 21st, 22d days; frost on the 6th—seasonable and pleasant; coolest day, 5th, 55°.66; warmest day, 14th, 80°.66. Amount of rain this month ... 5.90 do.

July; monthly mean, 72°.28; eight days entirely clear; two entirely cloudy; rain, 5th, 6th, 7th, 8th, 9th, 10th, 13th, 14th, 16th, 20th, 21st, 23d, 24th, 26th, and 29th—wet; harvest commenced, 3d; finished oat harvest, 29th; coolest day, 7th, 64°.33; warmest, 78°.66 .... 4.75 do.

August; monthly mean, 73°.41; six days entirely clear; five days entirely cloudy; rain, 2d, 3d, 4th, 11th, 14th, 15th, 17th, 19th, 20th, 24th, 25th, 26th, 29th, 30th—grain much damaged by wet; coolest day, 31st, 64°.33; warmest day, 12th, 82°.33. Amount of rain.............................. 14 20 do.

September; monthly mean, 61°.30; nine days entirely clear; three entirely cloudy; rain, 3d, 13th, 16th, 19th, 29th; first fall frost, 22d—pleasant weather, generally; coldest day, 30th, 40°; warmest day, 4th, 83°.33. Amount of rain.................. 4.50 do.

October; monthly mean, 54°.82; ten days entirely clear; five entirely cloudy; rain, 2d, 15th, 18th, 22d, 23d, 27th, 29th; frost, 1st, 17th, and 20th—pleasant; coolest day, 31st, 40°.66; warmest day, 6th, 69°.33. Rain .... 4.40 do.

Total amount of rain in six months.......... 38.42 do.

There was no rain table kept in March and April.

N. B. The thermometer has a northern exposure out of the direct rays of the sun, and was taken at sunrise, noon, and sunset; and out of that was made a daily mean, from which was found the monthly mean.

5th. Prevalence of blight or insects; probable per centage of loss by them, &c.?

Answer. There has been considerable loss from the ravages of an insect, called here chinch bug, on our fall wheat. They are a small insect resembling a gnat, but never fly. It commences on the young corn in the spring; but if not numerous, does little injury, seldom killing any. Last fall it was very bad on wheat. Out of a field of prairie sod, containing 40 acres, we had not more than 150 bushels, 15 acres entirely killed; so that we had to sow spring wheat on it, and this last crop was somewhat injured by it. Our case, however, is not a general one; but few of the kind in the county. On an average crop, we would have made 1,000 bushels, or 25 bushels per acre, as sod is our best ground for wheat. No remedy is yet found; burning the stubble destroys a great many; it is on the decline now as to the per cent. of loss. From the additional quantity sown, we think the crops of fall wheat will be about an average crop with 1847; and the crop of spring wheat, perhaps 20 per cent. more, from additional quantity sown. The wetness of our fall season has caused the potatoes to rot. There is, perhaps, about 25 per cent. of loss on that crop. No other insects heard of worth mentioning.

As to the cost of raising wheat, corn, &c., per bushel, I am unable to form a satisfactory estimate; and also the average consumption per individual of wheat, &c. The red chaff bearded wheat is most successful; price per bushel, prime, 60 cents. Corn, 12 cents; oats, 13 cents. Of rye, very little raised. Buckwheat not much raised. Corn this year, from additional quantity planted, will be an average with 1847, although 10 per cent. lighter crops. Potatoes, 25 per cent. less. Hay, an average; hemp, none; flax, very little; tobacco, none; cotton, none; rice, silk, and sugar, none.

Our country, being in its infancy, a rotation of crops is as yet not tried. Orchards are on the increase, but all young. Cheese and dairy business on the increase. Raising stock also advancing rapidly.

I herewith send you a list of cattle, horses, &c., from the assessment of the county of Lee:

Horses, number of, 3,480; value of, $113,291.

Cattle, neat, 8,315; value of, $78,677.

Sheep, number of, 15,405; value of, $15,405.

Hogs, number of, 14,371; value of, $17,587.

Mules, number of, 31; value of, $1,285.

Carriages, number of, 222; value of, $9,040.

Watches, number of, 387; value of, $6,131.

Piano fortes, 7; value of, $550.

Total value of land and improvements, $1,193,509.

Value of town lots and improvements, $456,861.

Value of capital employed in merchandising, $123,720.

Value of mills, carding machines, distilleries, tan yards, and stock employed, $18,100.

Total amount of all kinds of property in Lee county, $2,119,754.

Number of polls, 3,112.

Number of militia, 2,688.

Female wages, $5 to $6 per month.

Wages of laboring hands, from $10 to $16 per month.

DANL. McREADY.

Hon. Edmund Burke,
Commissioner of Patents.

Burlington, Iowa, *December* 20, 1848.

Sir: Owing to being absent from home, and a pressure of business, I have delayed to respond to your circular until this late day; but if anything I can make out of such meagre information as it is possible for me to obtain is of any value, I shall be glad of having furnished it. I thought of sending some wild grass seeds, but learned that our best varieties are known in some localities at the east.

For Racine county, our stable product is wheat; of which, we estimate the growth of 1848 at 160,000 bushels+25 per cent. over 1847; the insect did not work in the spring on it; average (say) 17 bushels per acre; price 40 to 47 cents.

Next in importance is corn; say 100,000 bushels+25 per cent. over 1847. More planted and better ripened. Say 35 bushels per acre. Price 31 to 47 cents.

Potatoes, 40,000 bushels—50 per cent less than 1847; cause, the disease. Price 50 to 100 cents.

Oats 100,000 bushels+25 per cent. over 1847. Price, 18 to 47 cents; 40 bushels per acre.

Rye, 10,000 bushels+20 per cent. over 1847; 30 bushels per acre. Price, 37 cents.

Buckwheat, 30,000 bushels+20 per cent over 1847; 15 bushels per acre. Price, 25 cents.

Barley 15,000+20 per cent. over 1847; 20 bushels per acre. Price, 40 to 47 cents.

One of the most important branches of business in this county is the rearing of cattle. There are probably 40,000, worth $10 a head+20 per cent. over 1847. Beef is worth $2 75 per cwt.

A large amount of pork is fatted, at a loss of $1 50 per cwt. It is worth $2 50 per cwt.

40,000 sheep; worth $1 50; they thrive well+10 per cent. over 1847 in number.

Poultry innumerable. Chickens worth 12 cents; eggs 7 cents per dozen.

But little tame hay is cut yet, and stock is kept chiefly on wild hay and coarse fodder.

Large quantities of flax are raised here, and more to the west of us, for seed. The lint is thrown away for want of skill to turn it to some profitable account, and for want of hands to do more with it. I suppose persons having capital and skill in the dressing and manufacture of flax might turn the lint to great profit.

Perhaps about 40 per cent. of our wheat is exported, and nearly all our other grains are consumed at home and in the lumber trade

on Lake Michigan. Some corn and barley, however, is sent east, and a large amount of hides, some pork, beef, &c., &c. Too much land is under cultivation, and more crops raised than can possibly be secured.

The greatest source of profit to the farmers in general is in their stocks of horned cattle, which is raised chiefly on the spontaneous products of the prairies, and the straw and corn fodder fed in the field. Horses, also, are very profitable to raise here. Cheese is worth 7 cents per lb., and butter 12.

The season since the 1st of July has been cool, and excessively stormy, which caused a great waste of grain and hay, and prevented the putting in of as much wheat as usual; but the prospect is unusually good for what is on the ground. Snow is now near 18 inches deep, and the mercury at 13° this morning, December 22, below zero.

With the exception of peaches, the prospect is fair, beyond expectation, for the successful cultivation of all the fruits grown in the northern States. Trees grow thriftily, and the fruits are very fair and good; but most grapes rotted badly last summer, and the late varieties, as the Isabellas, did not ripen perfectly, although they did not rot. There is increased attention paid to the culture of fruit among farmers and others.

The past season has been a healthy one.

The roads between the ports on the lake and the interior, have been almost utterly impassible for several months, causing incalculable loss and embarrassment to the business of both country and cities, and a strong effort is making to project plank roads from the lake towns, westward, into the interior of the country.

Mechanics' wages are from $1 to $1 75 per day and board, and a great deficiency in carpenters' and masons' help. Many have, of necessity, resorted to building *cement* houses, which, so far, has proved, with our strong lime, to answer an excellent purpose; and are built by farmers and others, requiring but little mechanical skill in the walls; and they make exceedingly comfortable houses, being rather dryer and warmer than brick and stone. Laborers' wages on the farm are from $10 to $15 per month, and board. Womens' wages, from $1 to $1 50 a week.

With highest regards for yourself, and best wishes for the success of the excellent objects of your department, I am truly yours,

O. PERKINS.

Hon. Edmund Burke.

Wheelock, Robertson County, Texas,
November 14, 1848.

Sir: In reply to your circular of queries issued from the Patent Office this year, calling for information in relation to agricultural statistics, &c., &c., I would state that it is difficult in this country to obtain the information required to make a satisfactory report of the state of agriculture. Our population is small, and scattered

over a wide extent of country, and we have no agricultural societies to aid in the collection and dissemination of agricultural knowledge. I will, however, give you the best information I have been able to collect from the counties of Brassos, Leon, Robertson, Limestone, Navarro and Dallas, lying between Brassos and Trinity rivers, and embracing about seven thousand square miles. In all these counties there are vast quantities of land of the best quality uncultivated, yet well adapted to the growth of almost every kind of agricultural products.

From this region of country, cotton and hides are the principal articles of export. Indian corn, wheat, cattle, horses and mules, all find a ready home market, the proceeds of which, together with the funds arising from the sale of lands, keep up a supply of currency sufficient to meet the wants of business.

Considerable attention is beginning to be paid to the growth of wheat, the quantity raised increasing as you proceed north. The time of sowing in this county is from the 15th of November to the 15th of December; quantity sowed per acre, $\frac{3}{4}$ to 1 bushel; time of harvesting, from the 25th of May to the 10th of June; average yield per acre, 30 bushels. The Mexican wheat, the red chaff, and several varieties from the north and east, do well. The whole quantity raised will be sown and consumed within the year. The average price, $1 per bushel; cost of production, 25 cents a bushel. Increase of production this year over 1847, in the six counties named above, 33 per cent.

In the upper portion of the country mentioned above, and still further north, in the country bordering on Red river, the production of wheat is increasing very rapidly; and were there a cheap and expeditious mode of conveyance to the Galveston and Houston markets, large quantities of wheat would shortly be forwarded to those places for shipment to distant markets. The same remarks will also apply to the increase of the cotton and other crops. The want of proper modes of conveying heavy and bulky articles of produce from this fertile part of Texas will be more seriously felt every year.

The following will be found tolerably correct estimates of the number of cattle, &c., and the production of the six counties named, for 1848, compared with the production of 1847:

Estimate for Brassos county.

Number of bales of *cotton*, of 500 lbs. each, 245—same as in 1847.

Number of bushels of *Indian corn*, 40,000—no increase over last year; the price varying from 25 to 40 cents.

Number of bushels of *oats*, not exceeding 600—increase over 1847, 100 per cent.

Number of bushels of sweet potatoes, small, on account of drought.

Wheat.—A small quantity raised this year—none in 1847.

Rye.—Crop very small, not exceeding 200 bushels.

Irish potatoes.—Crop small; production increasing; none raised for market; the time of planting, from 1st to 20th of February.

Number of *horses* and *mules*, 350; increasing.

Cattle, from 6,000 to 8,000, and increasing.

Sheep, but few.

Hogs.—There is a good stock, producing sufficient pork for home consumption, and probably 300 or 400 hogs for market. Price of pork, $2 to $3; price of beef, $1 25 to $1 50 per 100 lbs., on foot, and in demand.

Estimate for Robertson county for 1848.

Number of bales of *cotton*, of 500 lbs. each, 225—the same as in 1847.

Number of bushels of *Indian corn*, 40,000—about 10 per cent. less than in 1847, in consequence of drought. Price, from 30 to 50 cents.

Number of bushels of *wheat*, about 300—increase over 1847, 400 per cent. Price, $1 per bushel.

Number of bushels of *oats*, 1,500—increase over 1847 of 100 per cent. Price, 50 cents a bushel.

Number of bushels of *sweet potatoes*, ——; crop 75 per cent. less than in 1847, in consequence of drought. Price, 50 cents a bushel.

Number of bushels of *Irish potatoes*, not known; production increasing, but none raised for market.

Number of bushels of *rye*, estimated at 300—increase over 1847, 100 per cent. Price, 75 cents.

Number of *horses* and *mules*, about 650; increasing.

Number of *cattle*, 9,500; increasing very fast.

Number of *sheep*, about 700; but few fine sheep—increase in two years, about 650, partly by purchase.

Number of *hogs*, not known, but probably 5,000 or 6,000. The price of pork is $2 to $3; price of beef, $1 25 to $1 50 per 100 lbs., on foot, and in demand; price of cows, from $6 to $8 per head.

Estimate for Leon county for 1848.

Number of bales of *cotton*, of 500 lbs. each, 600—increase over 1847, 33 per cent.

Number of bushels of *corn*, 60,000—increase, 50 per cent. Price, 40 to 50 cents.

Number of bushels of *wheat*, 500—increase over 1847, 400 per cent. Price, $1.

Number of bushels of *oats*, 1,500—increase, 600 per cent.

Number of bushels of *rye*, 200—no increase. Price, 75 cents.

Sweet potatoes, not known; crop small, in consequence of drought.

Irish potatoes.—Production increasing; none raised for sale.

Horses and *mules*, *hogs* and *cattle*, about the same as in Robertson county.

Number of *sheep* increasing.

The price of beef is $1 25 to $1 50 per 100 lbs., on foot; pork, $2 to $3. Both raised in sufficient quantities for home consumption, and considerable for other markets.

Estimate for Limestone county for 1848.

Number of bales of *cotton*, supposed 700—increase over 1847, 250 per cent.

Number of bushels of *corn*, 150,000—an increase over 1847 of 50 per cent. Price, 50 cents.

Number of bushels of *wheat*, 25,000—an increase over 1847 of 2,300 bushels. Price, $1.

Number of bushels of *oats*, 1,500—increase, 400 per cent.

Number of bushels of *rye*, 300—same as last year. Price, 75 cts.

Sweet potatoes, 7,000—50 per cent less than in 1847.

Irish potatoes, not known; production increasing.

The number of *horses* and *mules*, *cattle*, *hogs*, and *sheep*, are estimated about 50 per cent. more than in Robertson county.

The price of beef on foot is $1 50 to $2; pork, $3.

Estimate of Navarro and Dallas counties for 1848.

Number of bales of *cotton*, not known, but as yet but little raised, although the soil and climate are well adapted to its growth; the raising of breadstuffs and cattle being more profitable, to supply the rapidly increasing population.

Number of bushels of *wheat*, 35,000 to 40,000; the production increasing, as well as that of *oats* and *rye*. Price of wheat, $1; corn, 50 cents.

Buckwheat has not been cultivated in either of these counties.

The number of *horses*, *mules* and *cattle* is very large and rapidly increasing, the pasturage being good the whole year. The number of *sheep* is also increasing, and will become profitable to the farmer of this country. There are but few fine sheep in Texas. They would meet with a ready market from other States.

There is pork enough made in these two counties for the consumption of the present population, but none for any other market; and should there be much immigation this winter, the deficiency would have to be supplied from other sources. The present price of pork is about $4 per 100 lbs.

The above estimates are made from information obtained of respectable farmers and others living in the various counties. The number of live stock is believed to be estimated too low, as I have added but a small per cent. to the number reported last year, which was taken principally from the assessors' books of the different counties.

The production of the dairy might be made profitable, but at present there is but little attention paid to the making of butter and cheese. Probably not more than 3,000 lbs. of butter were sent to Houston, our principal market, during the present year, and but very little cheese, and that of inferior quality, owing to want of skill in manufacturing. There is an abundant supply of poultry throughout the country; and honey, both wild and tame, sufficient for consumption, but none for exportation. The peach and plum are almost the only fruit trees yet cultivated. The vine and mulberry grow naturally in almost all parts of Texas.

Cattle in most parts of this country are ready sale, and command

money at fair prices. Hogs are principally fattened on acorns, and pork is ready sale at prices mentioned above. It is successfully cured here in the months of December, January and February, and always made into bacon.

The price of transportation to market is 75 cents per 100 lbs. for 100 miles; merchandise to the interior, $1 to $1 25 per 100 lbs. for 100 miles.

The wages of mechanics are $1 to $2 per day and board; agricultural labor—black men, $8 to $10 per month; black women, $5 to $7 per month. The quantity of produce raised in this extent of country may appear small; but it must be borne in mind that but six years ago the greatest part of it was used as a hunting ground by the Indians.

Should you deem the above worth a place in your report, you are at liberty to use it.

Very respectfully, your obedient servant,

S. W. KELLOGG.

Hon. E. Burke.

State of Texas, County of Jasper,
November 15, 1848.

Sir: In compliance with your request of your circular, I send you the statistical returns of this county, as the most correct information I have of the subject.

The crops are rated for 1847—no regular returns of the crop for this year; but as crops of every kind are good, they may be from ten to twenty per cent. better than last year.

Statistical returns of Jasper county, Texas, 1848.

Articles.	Value.
Cotton, 873,407 lbs., 2c. per lb	$16,468 14
Sugar, 18,040 lbs., 12c	1,804 00
Molasses, 1,130 galls., 50c	565 00
Indian corn, 35,244 bushels, 75c	3,496 00
Oats, 1,361 bushels, 75c	1,020 75
Potatoes, sweet, 12,275 bushels, full 50 per cent. better than last year, 25c	3,068 75
Wheat, 20 bushels, $1 50	30 00
Rye, 52 bushels, $1	52 00
Wool 83 lbs., 50c	41 50
Horses and mules, 452	22,460 00
Cattle, 4,139, $4	16,556 00
Sheep, 64, $3	192 00
Swine, 4,935, $1	4,935 00
Butter, 10,060 lbs., 12½c	1,257 50
Cheese, 685 lbs., 10c	68 50
Bee hives, 614, $2	1,228 00
Cultivated lands, 3,326 acres, $10	33,260 00
Amount	$126,503 14

Manufactories, &c.

Lumber, 450,000 feet, at $10 per 1,000	$4,500	
Five saw mills	10,000	
Seven grist mills	3,500	
Six gins	6,000	
Four stores	2,500	
Two grog shops	500	
Six blacksmith shops	300	
Two inns	400	
One watch maker	50	
Three spinning machines	300	
		$28,050 00
Amount brought forward from former page		126,503 14
Total		$154,553 14

As shown by the statistical returns of William S. Heaghey, assessor and collector of taxes in Jasper county, as returned and filed in the county clerk's office of said county.

Population.

Qualified electors		196
White males over 18 and under 45 years		179
Do. under 18 years old		286
Do. over 45 years		48
White females		442
Slaves		344
		1,299
Residents of town	58	
Do. county	897	
Slaves	344	
Total	1,299	

The soil of Jasper county is diversified, some parts having a black, stiff soil, and other parts light sandy soil—streams of water, that have their source within the county, and, in general, of the most clear and transparent kind. The lands are of medium fertility with other southern countries; no extensive marshes. The face of the country is gently undulating, and the healthiness of the people is, perhaps, not surpassed by any other county on earth. The county is large and but thinly inhabited, but capable of supporting a large population.

I am, sir, with due respect, your obedient servant,

JOHN FRAZER.

Hon. Edmund Burke,
Commissioner of Patents.

APPENDIX No. 4.

POTATOES.

Summary of opinions on the potato disease, by Dr. Fraas, professor at the university, translated from the Central Blatt des Landwirthschaftlichen Vereins in Bayern, of April, 1848, by E. Goodrich Smith, of the Patent Office.

1. It is more than probable that the potato disease is an old disease which has appeared sporadically already in its native soil, (about Bogota, according to J. Acosta, as Boussingault has stated,) as well as in the old world. (Ehrenberg, Böhle, Guempel, Jüttner.)

2. It is very probable that frequently the potato disease has been confounded with the curl disease, which had already before appeared as an epidemic, especially between 1776 and 1790, where the latter made itself well known as very destructive in the Netherlands and England.

3. A general deterioration of potatoes has been observed in Prussia since the year 1800. Curl disease and spots of rust on the stalk, have been noticed, (Stockmar;) the dry rot has prevailed since 1825, (a scholar of Thaers.)

4. The decline of the goodness of potatoes and the introduction of a soapy taste, has been observed in Europe since 1820, (Deutter,) and the potato disease must have already prevailed in 1823–'24 in Holstein, (Bohle,) and, according to Achtetstetter, even in 1817 at Neustadt on the Aisch, in Bavaria.

5. The disease appeared *more certainly* as an *epidemic* first in Holland and Belgium, and then spread itself over the continent and to England, (Herberger, Focke.)

6. It at first began very violent, and its progress was extremely rapid, and exhibited the particular aspect that the seed tubers first rotted and did not germinate. Failed in Pommerania, 1838, according to Sprengel's Monthly Journal of 1845, and in the Rhenish Palatinate in 1836 and 1841

7. The potato disease first became epidemic in North America, in 1843, though it had already been long known sporadically. (Report of the Commissioner of Patents, &c., for 1845. See Focke.)

8. We have collected the views of 70 esteemed natural philosophers, as well as agriculturists communicated to us and from their writings, and believe that of these probably one-third of all are already known; and also have more than 210, well versed in the subject, who have given their opinion somewhat differently. But all these opinions may be ranged under the 7 following classes.

9. The disease appears in every kind of potatoes at a definite

period of vegetation. In the previous years it was stationary (came to a stand still) in most kinds in the middle of August, and many of the pretty late kinds recovered themselves again, and exhibited a new and strong growth; while,

10. Potatoes first planted (from the previous year) in the beginning of September, became again diseased and showed the same appearances as those which had been before planted in July.

11. The disease was also checked in its progress by uniformity of weather, especially by dryness; but it had a rapid progress generally with any changes and extremes of weather.

12. The disease, since the first epidemic commencement, has gained much in extension, but fallen off in power, (intensity of appearance,) which was particularly evident the last year.

I.—THE FUNGUS THEORY.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1842..	In consequence of a disease of the potato plant among certain predisposing causes, by the development of the fungus tissue of *fusisporium*, (and of the *protomyces solani*,) the potato rot was produced ; but the *dry* rot and wet rot are *different* diseases.	Von Martins...	Agricultural precautions; the destruction of the seed of the fungus, by cutting off the stem, burning, &c.
1842..	Similar views as above contemporaneously maintained ; but as for the fungus named, it is a species of botrytis. (1845, in the Journal des Debats.)	Prof. Morren, at Liege.	The same.
1845..	Fungi—especially the varieties of botrytis.	Montagne and Payne, at Paris.	The same.
1845..	Fungi........................	Dr. Rohl and Von Heel, in Prussia.	Good preservation after the diseased tubers have been treated with chloride of lime, and then a solution of soda.
1845..	Fungi........................	Teschmaker, in Boston.	
1845..	Mildew, or rust................	Abbott, in the New Engl'nd Farmer.	
1846..	Fungi, with all the forces on which vegetation depends.	Professor Herberger.	Agricultural precautions.
1847..	Fungi........................ [The fungus theory is also adopted by Paquet, Lesquereux, Prof., Dr. Sprengel, (Wm. J. Berkley, of England,) &c.]	The Academy of Sciences, at Copenhagen, (according to Fadrelandet.)	

II.—INSECT THEORY.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1845..	The *altica atricella Fabr* is the original cause of disease.	Driessens......	
1845..	It is the *sciarra vitripennis* Kl..	A scholar of Thaers.	
1845..	Insects generally...............	Hartwell and Perkins, in the Union.	
1845..	Little insects sting the stem, draw out the nutriment of the plant, and hence the tubers become diseased. [The existence of disease from insects is also advocated by the privy counsellor, Albert, and the Gumbiner Georgina—a journal.] [*Gruby* supposes a peculiar class of the diseases of plants are from animal parasites.]	A. Domn Giulini, of Tomo.	Destruction of the leaves, and thus of the eggs laid in them.

THEORY III.

Is derived from the extreme condition of the weather, of the soil, manures, especially from moisture.

1842..	Moisture in a soil containing iron.	W. Lobe.....	
1845..	Rapid and extreme changes of the weather—heat, wet, and cold.	Universal Prussian Journal, No. 296.	To plant sound tubers; choose loose, mellow soil; not use fresh manure, to preserve them well; the so called agricultural precautions.
1845..	Cold fog......................	Bouchardat....	
1845..	State of the weather, and *root* years especially.	Prof. Kröts....	Agricultural precautions.
1845..	Too long continued wet........	Dr. Veit.......	The same.
1845..	Same.........................	Beyerlein	The same.
1845..	Same.........................	Mr. Abrell, of Kempten.	Increase of potatoes by sprouts and saline manures.
1845..	State of the weather—extreme wet or drought—frequent changes.	General committee of the agricult'l society in Bavaria.	Agricultural precautions.
1845..	Bad weather..................	Prof. Zerzog...	The same.
1845..	Wet..........................	Prof. Kauffmann.	Putting in layers of sand into the potato heaps—common salt as manure.
1846..	Frequent rain, and too great moisture of the soil in the time of ripening.	Prof. C. H. Schultz.	Precautions.
1846..	Night frosts while too luxuriant in its growth.	Dr. Kaltenbach.	
1846..	Frosts.......................	Hirschfeld.....	
1846..	Moist and unsettled weather; and thus the exhalation and evaporation prevented.	G. Phillips.....	Agricultural precautions.

THEORY III.—Continued.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1846..	Increase of extremes of weather compared with former periods.	Prof. Fraas....	After growth of seed strengthening of the sets, by leaving them green; also as a remedy for those which are partially diseased.
1846..	Sudden change of temperature...	J. Graham	Agricultural precautions.
1846..	Frequent change of temperature.	Deycks........	The same.
1846..	Unusual heat in alternation with cold and wet.	Vandermark....	The same.
1846..	Unfavorable influence of the weather.	H. J. Mohl....	The same.
1847..	Extreme weather, especially rain; hardening of the soil and interruption of the course of the juice; warmth of the soil.	J. C. Schmitt ..	Loosening of the earth, and entrance of air generally.
1847..	Continued wet, with too strong, lasting, fresh manure.	The superintendent Zwickendrath.	Culture in unmanured fields for a long time.
1848..	Excess of wet, and the thinning of the cellular walls thereby occasioned.	Prof. Reinsch..	Selection of seed; care of the cultivation.
	[Francoeur, Bonjean, Becquerel, and Gerard maintain the changes of rain, sunshine, and cold to be original causes of the disease; and Dr. J. Munter, in his admirable monograph (1846) respecting this evil, inclines to adopt this opinion, particularly looking upon the low temperature as the proximate cause.]		

IV.—THEORY OF DEGENERATION.

1841..	Too short vegetation in summer, and too great stoppage in winter, (with us,) and, besides, poor culture and preservation.	Zuccarini	Better cultivation, later ripening of the tubers, and care of seed.
1841..	Need of change of seed, and too frequent return of cultivation on the same field.	M. Von Renner	Change of seed and better plants.
1841..	The potato propagated by tubers is *too old* to be able to bear the bad state of soil and weather.	Dr. Guembel ..	Choice of seed and better culture.
1841..	The same	Pinkert........	The same.
1843..	Over ripeness, (only for production of the dry rot.)	Fikentscher....	*Whole tubers* for good seed generally, and good preservation.
1843..	Gradual after growth by tubers and their pieces.	Kalina Von Iäthenstein.	Selection of seed.
1843..	Bad preservation of the seed tubers, and the degeneration proceeding therefrom.	The Economist, Achtelstetter.	Careful selection and dry preservation of seed.
1845..	*Unripeness* of the seed tubers, and cutting of the same.	Deutter, in Muremberg.	By itself, (*per se.*)
1846..	Deterioration by culture generally.	Mr. Buck	Change of seed tubers and choice of seed.
1846..	The agents creating disease lie in the mother tubers; deterioration of the same	Dr. Mauz	Removal of moisture and warmth from the seed potatoes; good preservation of seed

IV.—THEORY OF DEGENERATION—Continued.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1846..	Softening. *Effeminacy* produced by too great culture, and hence a susceptibility predisposed to feel the extremes of weather.	Dr. Plieninger .	Choice, and precautions of culture; premature ripeness of the seed tubers.
1847..	*Softening* by cultivation, and hence greater tendency to feel an injurious influence. Drs. Lüdersdorf, Wirtgen, and Wahlen adopt, in the main, this view.	The Director, A. Gebel.	Precautions of cultivation.

V.—DEFECTIVE ELEMENTS OF THE POTATO THEORY OF CHEMISTS.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1842..	Deficiency in albumen, and too great quantity of starch meal *now* as compared to *formerly*.	Dr. Guembel...	Selections of seed. (See above.)
1845..	Decomposition of the cellular juice and of the nitrogenous substance at first, followed by rot.	M. Martens, academician at Brussels.	Agricultural precautions.
1845..	Excessive quantity of nitrogen..	Medical Faculty at Marburg.	
1846..	Increased amount of ammonia of the atmosphere and of the tubers.	Venger.	
1846..	Excess of phosphate of magnesia; abnormal, ashy elements.	Petzholdt......	Liebig's patent manure.
1846..	Direct chemical influence from without, (on the fine skinned kinds collectively.)	V. Gruben.....	Cultivation of the rough skinned kinds.
1846..	Similar	Johnson	Winter culture of potatoes.
1846..	Decomposition of the nitrogenous matter of the cellular juice, which retrograde of formation of starch and woody juices into sugar and gum is followed by fermentation and putrefaction.	Dr. Focke.	
1846..	The disease is the abnormal result of increased formation of coloring matter.	Dr. Budge.	
1846..	The brown matter of the potato operates as a ferment.	Girardin & Bidard.	
1847..	Excess in the quantity of nitrogen (albumen) in the tubers.	Prof. Fürnrohe.	Manuring with nitrogenous substances—charcoal.
1848..	Excessive quantity of nitrogen.	Proprietor Andra, of Gelchsheim.	Cultivation in light soil, without fresh manure; agricultural precautions.

VI.—DEFECTIVE MIXTURE,

Or want of atmospheric air and atmospheric state generally—miasmas without regard to weather.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1843..	Want of atmospheric air in the place of preservation, and in firm soils; hence an *asphyxy of the potatoes*; bad preservation.	Stieber, in Galicia.	Better preservation, especially in cellars.

VI.—DEFECTIVE MIXTURE, &c.—Continued.

Year.	Proximate and remote causes.	Author.	Radical and palliative remedy.
1845..	General atmospheric relations probably connected with the gathering of a definite time of development of the potatoes.	Ehrenburg.....	
1845..	Loss of air by the fastness of the soil by rain; hence, also, too great warmth of soil.	Dusseldorf, Carlsrühe, & Baden journals.	Loosening of the soil and harrowing up.
1845..	The same....................	Evans at Newton Abbot.	
1846..	Miasmatic substance in the atmosphere; hence the disease appears as a process of poisoning.	Collector Stobans.	Agricultural precautions.
1846..	Atmospheric influences generally.	Lord Portman..	Autumnal planting.
1846..	The same....................	G. Von Maldeghem.	The same.
1847..	Excess of carbonic acid in the atmosphere.	Croft, of Pennsylvania.	Neutralization and fixation of the same, strewing over them gypsum, ashes, and salt.
1847..	Excess of carbonic acid and electricity in the air and cellars; defect in draught of air.	J. Jüttner.....	Better cultivation.
1847..	Gases in the air which arise from the use of woods which excite phosphoric currents.	Zuppinger, of Zurich.	Of itself (*per se.*)

VII.—EXCESS OF CRUDE NUTRITIOUS JUICES.

	Luxuriant growth.		
1345..	Accumulation of unelaboud matter; dropsy.	Prof. Blume, in Holland.	Drier and looser soil.
1845..	Luxuriance of vegetation by great manuring and moisture; hence, cellular rot without deterioration of starch meal.	Kützing........	
1846..	Imperfection of the process of assimilation, on account of excessive watery cellular juices; and hence, resulting in the decomposition of the cellular substance.	Dr. Schauer....	Agricultural precautions.
1847..	Excess of crude nutritive matter taken up, and of very warm vapor; which, penetrating through the leaves, checks perspiration.	Hlubek	Sandy fields, little fresh manure, planting shallow, heaping up high.
1847..	Bad formation of the potato, abnormal formation of substance, and softening.	Surgeon Loew.	Strong and sound seed tubers.
1847..	Luxuriant growth and fungus...	Inspector Zinker.	Loosening of the stalk, by lifting up, and interrupting the growth.

Remarks.—Of the foregoing means of cure, the following have been proved inefficacious:

1. The employment of wood or peat ashes, strewed over the seed tubers.

2. The taking up the tuber for seed green.
3. The importation of seed; even the potato plants from seed brought from America having been greatly diseased.
4. The cutting of the diseased stalk, by which the growth of the tubers is, as is well known, decreased.
5. Liebig's patent manure.
6. The strewing the seed tubers with caustic lime, or dipping them into solution of lime.
7. The strewing over the stalk with caustic lime, or gypsum.
8. Planting them shallow.
9. The treatment of the seed tubers with mineral acids.
10. Even sprouts of the potato stalk become affected by the disease before tne tubers have set.
11. Stocks of sound and of diseased mother tubers are alike affected by the disease.
12. The winter cultivation of the potatoes does not protect from the disease; but it does not attack them so violently in such a case.
13. Dry preservation of the seed tubers has not protected from the disease.
14. Common salt, as manure, does not fully prevent the disease; but it appears not to be without effect on *particular* stocks.
15. Planting the seed tubers in *whole* or *parts*, is without any influence as to the existence of the disease. As to radical cure, there is none; but, as to a palliative one, the disease is rendered milder, and its extension has been lessened by some aids, of which the following deserve the most attention:

The cultivation of potatoes in dry, loose, warm kinds of soil not of a binding nature, avoiding a fresh animal manuring; careful loosening, heaping up, shovelling; (which is done in the most imperfect manner with the common plough, but much better with the shovel and hilling plough, and best of all by hand;) the digging out of the same, or gathering, in dry weather; drying off the tubers, and preservation in suitably constructed store houses, in dry, airy cellars, or even in well protected pits. We have mentioned the above in the general form of agricultural precautions.

Washington, Vermont,
January 19, 1849.

Sir: I have just finished the perusal of your report for 1847, which I received through the politeness of Hon. William Henry.

Agreeably to the suggestions contained on pages 154 and 155 of that report, I have written out in an imperfect manner the result of my experience and observations in relation to the potato crop in this vicinity for the last three years.

The imperfect knowledge which I have of agriculture, chemistry, and physiology, will render me incapable of giving an elaborate article as one versed in the above sciences; but it will be a plain statement of facts, of which you can make such a disposition as you think proper.

1. The soil in this vicinity is generally what is termed a "sandy loam," with a sub-soil of either gravel or hard pan.

2. The farm which I occupy lies on both sides of a small stream of water, running to the north, with narrow intervales on each side, and then rising into hills, extending in all directions, affording exposure to all points of the compass.

3. The soil is moist in some places—in others, dry; a field, which is cultivated frequently, embracing both varieties, has been cultivated about fifty years. The land, in a state of nature, is covered with a heavy growth of timber, consisting of maple, beach, birch, spruce, hemlock, fir, &c.

II.—1. Our method of preparing the land is, in the spring, we turn over a piece of green sward, and sow either oats or buckwheat, in the fall, after the crop is taken off; draw on and spread and plough in from forty to sixty loads (thirty bushels to the load) of manure. In breaking up, we plough from six to eight inches; after that, "beam deep."

2. Use no manure, except a compost thoroughly fermented.

Our mode of making manure is this: In the fall, our yards in which we keep our domestic animals are all covered with a coat of muck, turf, leaves, vines and all other vegetable matter that we can obtain; this remains in the yards till spring, when it is taken from the yards and composted with the manure which has been made in the stables during the winter.

Our mode of composting is this: We select some convenient place and spread a coat of muck, a foot thick, then a layer of stable manure, of the same thickness, then the layers of muck, and so on until the heap is completed; the piles are then completely covered with a covering of muck, to absorb the grasses which may be produced by the fermentation of the heaps. In the fall, the manure is carted on to the land, spread, and ploughed in. In the succeeding spring, the land is cross ploughed and harrowed, when it is ready for planting.

III.—1. The kind I use now, principally, is called in this vicinity the peach blow; I also raise the Long John, Carter, and Mercer, in small quantities. I have planted the seed both whole and cut—large and small potatoes; but have as yet seen no perceptible difference in the quantity or quality. The potatoes are taken from the cellar and planted without any preparation; we plant in hills in rows; the distance between rows, about 30 inches; between hills in the rows, 20 inches.

2. We plant as soon as we get in our grain crops, which generally is from the 12th to the 20th of May. Little attention is paid to the weather in planting, provided the soil is in a suitable condition to receive the seed.

IV.—1. No manure or other articles are applied after ploughing the previous autumn; the crop is hoed twice.

2. I have as yet been unable to discover anything peculiar in the appearance of the vine after it appears above ground, until the leaves begin to turn black, nor do I think the different varieties of weather, one from another, have any controlling influence on

them. During the summer months we have frequent changes from wet to dry, and from hot to cold; yet the vine obtains its growth in about the same time one year with another.

4. We intend to have the rows extend north and south, in order to admit the light and heat as much as possible.

V.—1. The time of the appearance of the "blast" varies in different fields, and with different varieties, generally from the middle of August to the 1st of September. The first appearance of the blast is a small black spot on the leaves nearest the ground, which continues to spread upwards until the whole is dried up.

The leaves are nearly dry, generally, before any symptoms of decay are observed in the tuber. The first appearance of decay in the tuber is generally near the root which connects it with the vine, and, in a majority of cases, those tubers lying nearest the stalks of the vine are the first to decay and in the greatest proportion.

I have tried the various methods of mowing off the tops, cutting off the blossoms, removing the balls, &c.; but as yet have seen no benefit to the crop.

VI.—1. We generally commence digging to feed to our hogs about the 15th of September, and dig from time to time as we want to feed them. Those which we wish to keep we let remain in the ground as late as we can without having them freeze. The amount per acre varies from 50 to 400 bushels. The amount of diseased potatoes ranges from 1 to 75 per cent.

I have frequently planted diseased tubers. If the eyes are sound, they will grow, although the rest of the tuber may be diseased, and to appearance the vine is as healthy as those produced from a sound tuber.

2. I have never been able to discover any injurious effect communicated from a diseased tuber to a healthy one by external contact; having frequently found, in digging, a perfectly healthy one lying in the soft mass of a decayed one; and in taking them from the cellar, many tubers, reduced to a soft pulp by disease, are found without any apparent injury to the rest.

The effect of leaving them in the ground later than usual is this with us: I think that the tubers receive the infection soon after the vines begin to blast, and by leaving them in the ground the disease will have sufficiently developed itself to be discovered in most of the tubers, consequently the sound ones can be preserved separate from the diseased ones at the time of digging. I am satisfied that a diseased tuber will sooner or later decay, all efforts to the contrary notwithstanding.

3. The modes of preserving them generally is in cellars, connected with the dwelling house. Some occasionally dig pits in the field to put them in, these pits being covered with straw and earth to protect them from frost and wet.

4. The diseased tubers are used in this place in two ways—one is to fat pork and beef; the other, in the manufacture of starch. Many farmers feed no others in the fattening of their pork. They are cooked before feeding, and the farmers generally think th value is not materially lessened in consequence of the affectioe

For starch, the tuber is considered equally as good as a sound one, if it has not become so far decayed as to be soft. It yields as great per cent. of starch, and of as good quality.

After the result of three years' experiment, I am satisfied that the best course to be pursued in this section of the country, in raising potatoes, is this: To use no manure, except that which has been thoroughly fermented, whether it is vegetable or animal; the land to be green sward, the soil well pulverized, and the manure thoroughly mixed with the soil. I am satisfied that fermentation of any kind, whether of the manure or the land, is injurious to the crop, the quantity of diseased tubers being in proportion to the degree of fermentation in the soil. The course of rotation generally pursued by farmers in this vicinity, is to plant and sow, alternately, the same fields year after year for several years; to manure the land with green manure each year that it is planted. From these fields, the greatest quantity of potatoes are produced—frequently 400 bushels to the acre. The per cent. of diseased tubers is generally as high as 50 per cent., and often as high as 75 per cent. In my method of cultivation, the average quantity of diseased ones has at no time been higher than 1 per cent. The yield this year on two acres was 350 bushels of as good potatoes in every respect as we ever raised. I plant the peach-blow variety principally, because it appears to be the most hardy and the least affected by the "rot." The Long John produces the greatest yield, but it is not as good to eat, and there is a larger proportion of diseased ends.

In closing this communication, I wish to say that, if any information which I can give which will be of use or benefit to you in your reports, I shall be happy to communicate at any time such as I may be able to give.

Very respectfully, your obedient servant,

C. T. ALVORD.

Hon. Edmund Burke.

Marengo, Co., Ala.,
February —, 1849.

Dear Sir: A friend has kindly loaned me a copy of the Patent Office report for the years 1845 and 1847; and I notice the great space occupied in both reports on the subject of the "rot" in the potato. And, judging from what I see there on the subject that suggestions might be acceptable, I have decided to offer my experience to you, to be used or not, as you deem worthy.

I have no doubt, then, that I have found both the cause and the remedy, at least with me. I know it is the cause; and the means of obviation has been completely successful. They are very simple.

1st. The cause of the rot in the Irish potatoe is the planting in too high or large hills, and the continuing to hill them up while they are growing.

2d. The remedy, then, is to plant in shallow or low hills, and not to hill them at all at any time during the season of their growth.

I might here stop. And I venture to assert that whoever plants

and cultivates in the above way will have good large and sound potatoes. But I will add the reasons that led me to try the method of cultivation, I here recommend.

I am a new farmer, having been engaged for twenty years in merchandise. And in 1844, when I began to plant, I bought Bridgeman's Young Gardener's Assistant; and I noticed, then, that he again and again reiterates that hilling to any extent would force *annual* vegetation to premature maturity; that is, by excluding the light and air from their proper influence on the roots of all *annual* vegetables by hilling, they are forced to maturity out of or before their due season; and experience has satisfied me that that is the whole cause of the potato disease. The first year I planted, I had the usual luck with mine—small tubers and many of them rotten, and all rotting so badly that it was impossible to keep my own seed potatoes. Since that year I have *not had a rotten potato*. I will detail my method of cultivation; and, if like causes produce like results where there is a great difference in the latitude, the farmers at the north, where the potato crop is so important, (here it is not important) can try it, and I hope will; and I can assure them the most entire exemption from the disease, no matter what the soil, (except, perhaps, a stiff clay,) and no matter whether the season be dry or wet, warm or cool, and no matter whether the land be highly manured or not, so it be rich enough to fetch a crop. I prefer rich sandy land.

My method of cultivation, then, is, to break up the land in the fall or winter, so as to let it become mellow; and when the time for planting arrives, run a furrow with what we call a bull tongue plough; drop the "cuts" six, eight, or ten inches apart, and cover with a Carey plough by a furrow from each side. No other hilling is done at any time, except what is given in the process of loosening the land about the roots, which is done about three times during the season in the following way: I have a grubbing hoe, made for the purpose, four inches wide and ten inches long; this the operator drives into the earth quite up to the hub and near to the plant, first on one side of the row, then on the other; and, while the hoe is in the earth, the handle is slightly elevated by the hand, so as to break the sod, thereby giving light and air to the tubers, and offering them room to grow, and, above all, not destroying the capillary attraction between the earth below and the hill. When the sod is broken, the hoe is withdrawn without turning over any part of the soil. The weeds and grass are kept under in any of the usual ways—by hoe or plough.

In my mind, the method of growing Irish potatoes in hills completely isolates them, as much so as if they were grown in pots, when the difficulty would be manifest to all—isolating them, at one time too wet, and at another too dry. And so universal has the practice become of planting in hills or ridges, and continuing to hill and ridge through the growing season, that it threatens to destroy one of the finest vegetables of the earth.

Very respectfully,

CALVIN NORRIS.

Hon. Edmund Burke.

APPENDIX No. 5.

[From the Louisville Journal.]

HEMP.

East India hemp.—We publish to day, from a distinguished missionary in the East Indies, an extract of a letter, giving some curious information in regard to the hemp of that country:

To the editors of the Louisville Journal:

AGRA, (EAST INDIES,) *October* 6, 1848.

GENTLEMEN: After a good deal of inquiry on the subjects of cultivation and manufacture of hemp, I am still more convinced that information upon these subjects obtained from India can be of little advantage to you, although it may interest you. Without further introduction I will answer your questions in the order they come as fully as I am able.

1. "Their hemp is called Manilla, Jute, and perhaps other names. What is it? Is it a list from a stalk, is it grass, is it the fibrous bark of a tree, or is it the fibrous pith of a stalk? I think Manilla is grown nowhere in India, but that it is a grass which grows spontaneously upon the seacoast of some of the Asiatic islands. I am well satisfied of the truth of this assertion, although I cannot say it is positively so. This seemed to be the conviction of one or two gentlemen whom I questioned upon the subject. The name of the hemp grown in Bengal is Jute. This is the article from which the bailing cloth, bags, &c., which are exported, are made. It is also used for the same purposes extensively in India, particularly in Bengal; and is made into a finer kind of cloth, about as fine as the coarser kind of "country linseys" common in Kentucky. It is used in cordage upon Hindoo boats, and I think for sails. It is preferred for these purposes to the up country hemp, because it is less injured by water. The hemp grown in Northwest India is called Sur. It is a harsher article than the Jute, and rots more rapidly when exposed to rain or used in water; in other respects it is about equal to Jute. It varies in color and softness very much, some of it as white as water rotted in our own county, and some as dark as our darkest dew-rotted. I think it is finer though harsher than Kentucky hemp, while Jute is softer. There is another kind of hemp which grows wild in the hills at the foot of the Himmaleh mountains. This is a better article than either of the others; from it a beautiful canvass is made, a specimen of which, together with other specimens, I hope to send you soon. From this is also preserved a kind of liquor which produces intoxication

of the most dreadful kind, exciting every passion in a high degree. A man under its influence looks like a madman, and exhibits his excitement by dancing, singing, shouting, and tossing his arms. The Hindoos, some of them, are very fond of it; particularly peltry bearers. They say it makes them forget all their pains and fatigue. The name of this hemp, and the preparation from it also, is "Bhnm." It grows spontaneously in the hills. The reason assigned for the very limited use of so fine an article (the hemp) is that but few of the Hindoos can touch it without violating the rules of caste. All of these articles are bark from a stalk resembling our hemp, varying in height from four to seven feet. Besides these articles there is a fine grass which is used a good deal in twine. This is not as pretty an article as Manilla. The fibres from the cocoanut are spun into rope and used on board native ships, and to a limited extent, on English vessels; at least I saw some of it on the ship which brought me out. It is very light. The chief objection to it is that it may be stretched to almost any extent. I have been told of two or three kinds of plants, the whole of which, except the bark, is a kind of pith through which are fibres which may be used as hemp. One of these is the aloe plant. This is used very little. Cotton is also made into ropes (as well as into all sorts of cloth,) and used a good deal in this way. 2. "How is it grown, is it cultivated or does it grow wild? Give particulars as to mode of cultivation and preparation for market." I shall answer this question only as relating to Sur. Jute is cultivated and prepared, I am told, in precisely the same manner. The ground is prepared by ploughing, making the ground soft, say upon an average of two inches deep, though much of it is not touched with the plough; only having a very small quantity of loose earth thrown over it or a small proportion left untouched; the seed is then sown, and it receives no cultivation except pulling out the weeds or cutting them up with a small instrument, resembling a chisel, about four inches wide, with a crooked handle like that of a hemp-hook, only not so long or so much crooked. It is sown during the rains, as early as convenient. The rains begin to fall generally about the middle of June. It is cut with a little hook resembling a pruning knife, the whole not more than eight inches long, in October or November. It is then placed immediately in the water where it remains ten days; it is then taken out, and, while wet, the lint is picked off with the fingers, then washed thoroughly, sometimes by rubbing sand through it so as to remove all the glutinous matter; it is then dried and tied up in bundles for sale.

Of course it cannot well be rotted in this country by spreading it upon the ground, as there is very little rain except during the rainy season, which ends a little before the time for cutting, and then the rain falls almost every day for two or three months; so that it would be impossible to rot it in this way without great risk. The time of the beginning and ending of the rains are very uncertain, varying two or three weeks or more. 3. "Does it grow in marshes, by the sea shore or on high lands?" So far as I have seen India, it is one almost unbroken and interminable plain. Any-

where in the plain the two kinds of hemp, Sur and Jute, or Putwa, as the natives call it, grow; Jute, or Putwa, growing in the south, and Sur in the north. 4. "What is the value of it per pound in our currency?" The value of the Sur in our currency is about 90 cents per 100 pounds, or a little less than one cent per pound. The son of a farmer told me the price of Sur was 82 to 90 cents per hundred. The price of Jute is about 90 cents per 100 pounds. Gunny bags, made of coarse cloth of Jute, three feet long by two broad, are worth three cents apiece in Calcutta. A finer cloth, made of the Jute, sells for three to four cents per yard, two feet broad. There are great quantities of cloth made of Sur in the northwest, very coarse, but even and strong; price about three-quarters of a cent per yard; but this is only nine inches wide. I will give you the price of cotton, also. One person says between 4 and 8 cents per pound; another says 3. Probably one alludes to the price in the northwest, and the other in Calcutta. I suppose this is the case; for with the one I spoke altogether of the price here, and with the other chiefly of the price in Calcutta. You must consider them as the Calcutta price, except the cheaper price of cotton, and the price of Sur, and the narrow cloth made of Sur. The grass is very cheap, say half cent per pound, or less. Of this cloth, I do not know the price. 5. "How is it manufactured into cloth, (cotton bagging?) How is it spun? What preparation is necessary before spinning? How is it woven?" Their mode of manufacturing is as simple as it could well be. If twine, a man stands erect, with a bunch of hemp under his arm, a spindle in his right hand, hooked into the hemp; he twirls the spindle with his fingers, and lengthens out the thread as the spindle descends; when it comes near the ground they catch it, wind up the thread, and begin again. If a large cord is being spun, the operation is performed somewhat after the same manner as horse-ropes were spun long ago, only the machinery is plainer and more rude. They have another rather singular way of giving twist to the cord. They have two pieces of wood, about three feet long; one end placed in the ground, the other resting against a tree or some other support at an angle of 70 or 75 degrees; and there are two spindles which a man turns by means of a small cord passed around them, one end of which a man holds in one hand, and the other end in the other hand. I have not examined it so as to see how pulling the two ends turns the spindle the same way. The weaving machine, as described to me by a native Christian, is much like the hand-looms used in Kentucky, except they also are more simple and rude. Last, "To what extent can the manufactured article be produced, and at what prices per yard, if there should be a sufficient market for it at remunerating prices?" At the present rate of prices, and the present mode of cultivation and manufacture, probably little more would be produced, however great the demand. But if our mode of cultivation and manufacture were adopted, I suppose five times the amount would be produced by the same amount of labor as is now expended upon it. This remark is probably true with regard to everything else produced in

India. If you were to watch the process of cultivating a crop you would not easily be surprised at the smallness of the yield. The soil of India does not seem to be very rich, but the same ground may be cultivated year after year without manuring. And when the rains come pouring down upon the hot earth, you would think vegetation would spring out of the very sand banks and walls. This year has not been a fair specimen at all. Throughout India scarcely half the usual crop will be produced; and great, very great suffering is everywhere expected from the famine. The season is now over. The crops are withering upon the field; and a great part of them could not be restored by any amount of rain. But little if any more can be expected.

APPENDIX No. 6.

CULTURE OF THE ARTICHOKE.

[Translated from the French by E. Goodrich Smith, of the Patent Office.]

*Instruction on the culture of the artichoke as a green fodder.**

The *artichoke* or *earth pear*, a native of the most northern portions of Mexico, has been known in Europe for more than two centuries, and its culture was established long before that of the potato. It is, however, only since 1823 that a beginning was made of bringing this crop into extensive cultivation, namely, in Alsace, in the environs of Strasburg.

1. *Use of the product.*

Two portions of the plant can be applied to use in the artichoke; the tubers and the stalk.

The tubers are regarded in Alsace as an excellent nutriment for milch cows, to which they are almost always given, together with beets and potatoes. They are equally good as food for horses, which are thus kept in very good condition and sustain hard labor; the daily allowance 0.10 hectolitre for horses, to which is given an equal quantity of dry forage. Sheep are very fond of this root, joined with dry food; 1 hectolitre per day may be given for 120 head. It would also be useful in this last case to add a small quantity of salt to this food. We may further say that artichokes are the most healthful for animals where they have been most recently gathered.

In the experiments which we have made on the comparative cultivation of the principal root plants used for fodder, we have found that the potato expresses in its composition 22.23 per cent. of dry matter, the artichoke 19.60. M. Boussingault found in the artichoke of Alsace 20.8 per cent.

The stalks are nearly of as great use as the tubers, and here is the advantage which it has over the potato.

The stalks of the potato cannot be employed either green or dry.

Although the cutting of the stalk at the beginning of September may diminish the growth of the tubers one-third, the fodder which we obtain may have, at the period when we begin to need green feed, such a value that the loss caused in the quantity of the tubers is amply compensated.

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*These directions have been prepared in the name of the Central Society of Agriculture of the Lower Seine.

According to Schwerz's experiments, 100 kilogrammes of green stalks equal, as regards nutritious qualities, 31.250 kilogrammes of our hay. In every case this must be given to beasts mixed with other vegetables; its value is thus increased, and it renders the autumnal plants more nutritive by increasing their consistence. Thaer advises this food especially for sheep which are very dainty.

When we can dispense with the use of the green stalk of the artichoke, there is every advantage in cutting them as late as possible, in order to leave the tubers to take their full development. Then the stalks can be employed when they are dry. In this state they furnish a good forage, which all kinds of domestic beasts eat readily.

Although seemingly more appropriate to horses and sheep, they yet agree likewise with horned animals.

There is no need of trouble on account of the black color which the leaves take in drying; when this hue is not the result of too premature drying, it no more injures their quality than does a species of whitish efflorescence which shows itself on the surface of the leaves, and which resembles a mould.

Finally, the stalks of the artichoke have, for *fuel*, a value which no other product of field culture has. In this case it is best to leave them standing till they are completely dry. To prepare them for use more conveniently, they are cut in two and made up into faggots. This fuel is especially adapted for heating ovens or furnaces.

M. Boussingault tried the experiment, and this use of the artichoke is perhaps the most profitable—to introduce the dry stalks into the litter of hogs; the pith, which forms the great part of it, absorbs a great quantity of liquid drainings.

2. *Climate and soil.*

Of all plants proper for food, the artichoke is unquestionably one of the most accommodating in this respect. It bears under ground a degree of cold which no other of our tuberous plants will do. Besides, one can, without the slightest risk, leave it all winter in the ground, where it is in no danger except from moisture, which destroys it, while the frost leaves it untouched. It supports with equal facility a great degree of dryness. We see, indeed, its leaves fade when the heat becomes very great and the drought prolonged; but it resists it, and the night is sufficient to refresh and recover it.

With the exception of marshes, all places and all soils are good for the artichoke, from the richest wheat to the most gravelly and dry, and even to the most barren calcareous soil.

This plant, too, the product of which is always greater in proportion than that of other fodder roots in moderate soils, will yield, it is believed, a more abundant crop than when the ground is of the best quality.

The trials which we have made on the production of the differ-

ent sorts of roots in the principal kinds of earth, have given us as the result in respect to the artichoke:

Alluvial land	20.868	kil.,	of tubers.
Turfy sand, *very dry*	26.768	"	"
Sandy clay	22.568	"	"
Calcareous earth	18.908	"	"

These products have been furnished us by 8 tubers, weighing each about 0.60 kil. Hence it follows that the dry and light soils are those which best agree with this plant.

3. *Its place in the rotation.*

The difficulty we experience in wholly destroying the artichoke in the soil where it has been cultivated, has determined many cultivators of Alsace not to introduce it into their regular rotations. They set apart to it for a number of years a particular soil, as is done in making artificial meadows of a long period, as luzerne, sainfoin, with which it may be alternated. *Kade*, an Alsacian, saw the same soil produce every year for thirty years a tolerable crop of stalks and tubers of this plant, though it had not for a long time received either culture or manure. But if we wish to obtain large crops, it will be well to replant every two years and manure only once in four years. If, however, it is desired to bring this crop into a regular rotation, the following is, according to *Yvart*, the best:

1st year. Artichokes, after ploughing and manure.

2d year. Spring grain, with artificial meadow. In the ploughings and harrowings, the tubers and roots of the artichoke which have escaped are carefully gathered up; afterwards, it is indispensable to destroy the new sprouts with the weed hook.

3d year. Artificial meadow.

4th year. Winter grain.

4. *Preparation of the soil.*

The soil is prepared for artichokes in the same way as for potatoes; it is also manured the same. Besides, as we shall mention hereafter, this plant is less exhausting of manure than the potato, but it supports itself also without the crop suffering.

5. *Planting.*

We begin to plant artichokes at the end of winter, as soon as the time and labor of the farmer will allow. This work ought to be over, at the longest, by the middle of April, because this plant will suffer by too rapid vegetation. As the tubers do not dread the frost, they can also be planted in the winter. This may even be preferable in dry soils, and there is no danger of too great moisture. It also lessens the amount of tubers, always too numerous in the spring, and the plants are the more vigorous in such soils.

We may use for planting, with equal success, tubers of all sizes; we may even use withered tubers, provided we soak them two days in water before planting.

The experiments of *Kade* show that the planting of pieces of the artichoke has not the same success as in the case of the potato; we ought, therefore, to choose whole tubers. The method of planting artichokes is similar to that of the potato, only they ought to be placed at a depth of one-quarter less. If we use small tubers, it is necessary to put two or three in the same place. The space to allow between each tuber ought to be larger than between potatoes, because this plant occupies more room. In Alsace they plant one metre apart in all directions.

6. *Care of them while growing.*

As with all the plants set widely apart from each other, this which now requires our attention demands a treatment suitable to keep the soil in good state and to favor vegetation. A first ploughing or digging is given to it as soon as the earth begins to put forth weeds; this again is repeated as often as the state of the ground and the hands at command will allow. These labors are carried on with a horse hoe the first year after the planting, because the lines formed are preserved; but this regularity disappears in the following years if the field is left without planting anew. We are then obliged to carry on these diggings or weedings by hand. It is necessary in this case to keep the stalks from growing too near, in order that the plants shall not mutually withdraw each other's nourishment. One or two cuttings will be necessary to favor the number of the tubers. If we care not more for the quantity of leaf than for that of the product beneath the ground, we may dispense with this last labor.

7. *Gathering.*

As the gathering of the stalks and those of the tubers do not occur at the same time, we must consider them separately.

The *crop of stalks*, which are designed to serve as dry fodder, must be gathered about the second half of September; sooner, it would too much injure the formation of the tubers, and the leaves would be less nutritious; later, the moisture of the season would not allow them to be properly dried. To cut the stalks we use a sickle a little stronger than that usually employed, and cut them 0.30 metre* from the surrounding soil. As soon as the stalks are cut, they are bound in bundles of 0.25 metre to 0.30 metre in diameter, avoiding binding them strongly; these bundles are placed together, by parcels of seven in a parcel. After a week, and when the leaves are well dried outside of the bundles, the parcels are taken apart; then they are joined together, three by three, in a heap of twenty-one bundles; fourteen of these are arranged in a parcel; the other seven, the cut ends upward and strongly fastened towards that end, are placed in the form of a pointed roof. Thus arranged, the heap

* A metre is 3.281 English feet.

obtains the greatest degree of dryness possible, without there being any danger in the most unfavorable season.

The *crop of the tubers* may be gathered without inconvenience from the end of October to the middle of April, since as we leave this part of the plant it is in no danger from the most severe winters. It follows, therefore, that instead of providing cellars, storehouses, as is indispensable for other roots, we can gather them at pleasure and as they are needed. Far from experiencing any damage, the tubers left in the ground, even to the end of winter, continue to grow, as the observations of Schwerz have demonstrated. The great enemy of artichokes during the winter is moisture, which may rot them. We cannot, therefore, avail ourselves of the benefits of a prolonged gathering except in dry soils, and we shall be forced to gather them at the end of autumn in most soils.

As to the method of digging up the tubers, it is the same as that employed for potatoes, only it is necessary to take great care to gather all the tubers and the roots which may spring out with the next crop, at least always when the soil is not designed for a similar production for many years in succession; in this case, those which remain in the ground will serve as seed for the following year.

8. *Preservation of the tubers.*

As we cannot gather artichokes as we want them, except in dry soils, it is necessary to profit by the thaws to make small supplies during the period the earth is frozen. The following method, if adopted, will prevent us from being obliged to gather the crop in the autumn in moist ground: It is sufficient to make a heap and cover them with earth, for they are not affected by the cold except when exposed to the open air; thence we take what is wanted, thaw them if frozen, and put them to immediate use.

9. *Product raised.*

The product of the artichoke on an average, according to Schwerz and Kade—the portion of the stalks which is not fit to be eaten being deducted—amounts to 7,500 kilogrammes of dry leaf per hectare.

	Hectare.	Kilogrammes.	Authorities.
Sandy soils..............	428	12.240	Schwerz.
Soil of first quality......	319	55 520	Kade.
At Bechelbronn, medium.	330	26 400	Lebet at Boussingault.
Receipt of 1839–'40.....	441	55.272	" "

We see that, generally, the product in tubers is considerably more for the artichoke than for the potato, since the latter only yields on an average, 271 hectolitres per hectare.

GIRARDIN,
DUBREUIL,
Professors of Rural Economy of the department of the Lower Seine.

APPENDIX No. 7.

MADDER—RHUBARB.

On the culture of madder, by Count Gasparin.

[Translated from the Journal d'Agriculture Pratique et de Jardinage, by E. Goodrich Smith, of the Patent Office.]

Madder and indigo are the two most important dying substances, for they furnish the most beautiful and durable colors that are known—one of them all the red shades; the other, the blue.

We make use of the madder root, known in commerce by the name of *alizari;* of the root reduced to powder, which bears the name of *gàrance*, (madder;) from its powder, a solution, saturated by concentrated sulphuric acid, is made *garancine;* and lastly, from an alcoholic extract of garancine, which is called *colorine.*

The coloring principle, which is called *alizarine*, crystalizes in red needles on the alcoholic extract being evaporated.

The ancients were acquainted with the use of madder, and cultivated it. Pliny informs us (1) that it was a culture reserved for the poor, who obtained from it great profits, and that its root was employed for dying wool and leather. Dioscorides, who wrote in the first century of the Christian era, tell us (2) that the madder of Tuscany, and principally that of Sienna, was celebrated, but that it was likewise cultivated in nearly all the provinces of Italy. The cultivation of this plant must have been common in Gaul, for the invasion of the barbarians had not wholly destroyed it, when, under Dagobert, foreign merchants came to purchase it at the market which he had established at Saint Dennis, which is shown by a chart in which that prince fixed the duty to be paid for its export. (3) Saint Dennis remained, for a long time, the market for madder and woad of France. In 1275, the prior of that celebrated abbey entered into compacts on the subject of the tithe of madder. (4) We find in the Cartulary of Troarn transactions relating to the tithe of madder of the year 1122. (5) Under Henry IV., Oliver de Serres mentions its culture; but the Flemings had possession of that profitable branch of products, and this author wrote, on the borders of the country, which, at the present day, produces the best madder, that it was necessary to send to Flanders for madder of the best quality. (6) In the sixteenth century, Lobel points out

(1) Lib. XIX., chap., Natural Hist.
(2) Lib. III., chap. 143.
(3) Recueil des Hist. de France de D. Bouquet, t. IV., p. 616.
(4) Discours Preliminaire de l'Edition d'Olivier de Serres, de la Societé Centrale d'Agriculture, p. CXLV.
(5) Memoires de la Societé Linnêenne du Calvados, t. I., p. 166.
(6) T. II., p. 429, de l'Edition citee.

Germany and Zealand as the countries in which this cultivation was most extended. (7) Schwertz affirms that madder was introduced into Alsace on the plains of Hoguenau, by means of the Emperor Charles V. It was, so to speak, established in the Batavian provinces, from whence the able Holland merchants dispersed it in all the markets of Europe, after they had mixed it with the alizaris of Levant. But it was in the east, in Syria, in Asia Minor, Greece, and especially Livadia, that this culture was extended, and procured vast profits to its cultivators. Thus madder, propagated at the north and in the south of France, seemed to be repelled by the ignorance of the cultivators and negligence of the proprietors. It was not till the middle of the last century, that a Persian, named Althen, introduced that cultivation into the department of Vaucluse, where was found lands most suitable for its growth, and where it at present is predominant above all other products. The grateful department is about to raise a monument to the memory of that benefactor of the country. It is apparent, from this review, that madder succeeds in the most diverse climates.

1. *Growth of madder.*

The stalks of the other kinds of the genus *rubia* are long-lived; but, as to common madder, (*rubia tinctorum*,) its roots only are long-lived, and its stalk withers and dies every year. This plant has nothing to fear but an excess of moisture. When the earth is very dry in summer, its growth is suspended till a return of rain; but in fresh soils, it continues without interruption as long as the temperature does not sink below 10°, (or 50° Fahr.) It is evident, then, that its development, the soil being equally fertile, is proportioned to the period of time in which it vegetates, under the influence of the state of freshness of the soil, a period differing according to the soil and climate.

This observation has struck us for a long time; and we have found that in the climate of Vaucluse, and lands of the same nature and riches, of analogous situation, the products corresponded nearly to the power of the soil to retain water, as the following table shows:

	Power of retaining water.	Product.	Proportion.
1. Marshy soil of Thor.............	56.48	77	77
2. Alluvial soil of Orange.........	51.30	68	70
3. Marshy soil of Orange.........	48.36	60	66
4. Marly soil of Tarascon.........	43.60	57	60
5. Soil of Bobine..................	32.60	42	45

But it may be said, more generally, that, in soil possessing an equal fertility, the product is proportioned to the period of growth; *i. e.*, to the period of a state of freshness of the soil, multiplied by

(7) Adversaria, p. 357.

the entire heat during this period. This principle seems to be established by the relative products of the marshy soils of Vaucluse, which possess a sufficient moisture during the whole period of the summer, and which yield 3,957 kilogrammes* of root per hectare, having received 5,078° of heat, while the dry soils, having two months of summer repose in its growth, not having received in that time but 3,215° of heat, yielded only 2,505 kilogrammes;

$$\text{Thus: } \frac{3,957 \times 3,315}{3,708} = 2,505$$

Irrigation is skilfully employed for the single purpose of keeping up the freshness of the soil, in causing it to act by infiltration every time that the earth is brought to a state of dryness, (at least of 0.10 of moisture at 0.33m. of depth,) by means of the introduction of water into the ditches which separate the beds of earth, as a supply to the natural freshness of the soil. The abuse of this influences the quality of the madder; the tissue of which becomes too loose, and besides, exposes it to the appearance of the rhizoctone, as this takes place in lands which are under the influence of subterranean moisture.

2. *Component parts of manure for madder.*

In its fresh state, the root of madder pulled at the age of thirty months, retains 0.72 of water; at eighteen months, 0.74. (8) M. Koechlin found in Alsace, 0.78-38 of water. If the ground is moist, the quantity of water rises as high as 0.80.

In that state of dryness in which the root is marketable, and which we term the normal state, it loses 7 or 8 per cent. to reach to complete desiccation. Then it gives 9.78 per cent. of ashes, according to the analysis of M. Payen. M. Girardin found that the powder of madder, well cleansed of the rind, contained 5 per cent. of ashes; from which it follows that the rind and earthy matters which remain inevitably attached to it represent a weight exceeding 4.78 per cent.

The root, in its complete state of desiccation, according to M. Payen, yielded 1.33 per cent. of nitrogen, and consequently, in its normal state, it contains 1.24 per cent.

The dry stalk, in its normal state, retains 18.4 per cent. of water. It contains 0.81 per cent. of nitrogen in the dry state, and consequently 0.66 in its normal state.

We have three analyses of the ashes of the root—the two first made on the madder of Alsace, by M. Koechlin, and the third by M. May, on the madder of Zealand:

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* A kilogramme is 2.204 lbs. English.

(8) Bastet Essai Sur la Culture de la Garanee, p. 85.

	I.	II.		III.
Potassa	20.30	18.07		2.73
Soda	11.04	7.91		20.57
Lime	24.00	19.84		13.01
Magnesia	2.60	2.50		2.53
Peroxide of iron	0.82	2.28		2.13
Phosphoric acid	3.62	3.13		13.44
Sulphuric acid	2.56	1.45		2.28
Chlorine	3.27	8.98	chlorate of soda.	10.04
Silex	1.16	3.63		13 10
Carbonic acid	25.83	21.35		11.60
Carbon	4.13	11.48		5.63
	99.33	100.62		97.36

In these analyses we find, after subtracting the carbonic acid and carbon, the following quantities of alkaline bases:

	I.	II.		III.
Potassa	29.00	27.00		3.30
Soda	15.79	4.66	Comprising soda and chlorine.	30.85
Lime	34.28	29.60		15.79
	79.07	68 26		49.92
Phosphoric acid	5.17	4.67		16 29
Silex	1.77	5 42		15.88

We see the degree of difference, according to the soils, of the mineral elements drawn from the ground by the plants. The soda evidently supplies other alkaline bases in the saline soils of Zealand. The compactness of the root is owing to the lime in the two first instances, and to the silex in the last instance. These analyses tend to show that the essential thing for the growth is that the plants should find soluble bases in the ground, and that the choice of the bases is of less consequence than has generally been supposed.

One hundred kilogrammes of root have in 30 months less than 150 kilogrammes of dry stalks, the roots and stalks both being in a normal state; we have, therefore, as the index for the manure of the plant in the soil—

100 kilogrammes of roots	1.23	of nitrogen.
150 kilogrammes of stalks	0.99	"
	2.22	

The last experiments have proved that the application of 1,200

wt. of stable manure, yielding 480 kilogrammes of nitrogen, give 3,840 kilogrammes of roots; 12.5 kilogrammes of nitrogen, therefore, necessary to produce 100 kilogrammes of roots. Now this harvest above takes only 2 22 kilogrammes; that is to say, its proportion of consumption is 0 175 of the entire manure. It is, then, an exhausting and backward plant which can live on abundance; but not very profitable. After the harvests, the surplus of the manure, if it has been so prepared as to preserve the nitrogen, remains for the following crops; and, indeed, luzerne and wheat succeed very profitably to this plant, and exhibit by their vegetation the good state of the soil.

The extension of the use of stable manure in the cultivation of madder, shows that it is, indeed, a perfect manure for this plant, when it is derived from animals in a good condition and thoroughly fed; but this kind of manure does not answer one of the desiderata of this culture. If, in certain cases, we have to fear the too great fertility of the soil, when speaking of plants which we cultivate for their seed or fruit, it is not so when we desire to produce roots or stalks; then the limit of fertility is singularly enlarged. It has been attempted to extend it more and more in the case of madder; but we have been obliged to arrest it when, by the employment of a great quantity of stable manure, the earth sustained by the latter needs stability, and leaves the seed and roots without support, exposed to the air in the void spaces which it everywhere presents. We might, then, believe that we have attained the highest maximum of the crops when we gather, from soils best constituted, 3,375 kilogrammes of roots after thirty months' cultivation; but the employment of powdered manures, and especially oil-cake, having been introduced, and this manure being such that it can be spread out in unlimited quantity without changing scarcely the physical state of the soil, we have thus been able to obtain yet larger crops. In the actual state of the culture, the maxima obtained are 5,620 kilogrammes per hectare in the department of Vaucluse. The proprietor of the polder of Wilhemina at the environs of Goes, gathered, in 1846, a mean product of 6,096 kilogrammes per hectare on a surface of 60 hectares of madder, (9) This crop was the result of the first application of manure, containing 762 kilogrammes of nitrogen, in which 135 kilogrammes were absorbed by the plants. They could be supplied by 190,000 kilogrammes of farm manure, or by 15,487 kilogrammes of oil-cake of colza, or better yet by a mixture of the two kinds of manure in proportions, which, without changing the physical properties of the soil, furnish a sufficient quantity of nitrogen and carbonic acid.

In fact, oil cake is not by itself as perfect a manure as that of the dung-hill; when any one continues to employ it alone, the crops sensibly decline, and cease to yield in proportion to the quantity of the nitrogenous element; they recover when we mix or alternate the two kinds of manure. This fact being well ob-

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(9) Comptes Rendus de l'Academie, t. xxiv., p. 427.

served, will always render the mixture of a certain quantity of litter manure necessary with the more rich sort, but in a much weaker proportion than what is susposed.

3. *Soils best fitted for madder.*

It is a fact which is now generally admitted, that madder may be raised on all sorts of soils; that it prefers light ones, provided they are fresh; and, in fine, that it does not fully acquire its coloring qualities except in those in which the carbonate of lime forms a large portion. Thus, the marshy soils of Vaucluse have 90 to 100 of carbonate of lime; the polders of Holland are likewise rich in this substance. When the soil is deficient in this respect, we are forced to employ the substance afterwards in the coloring treatment to revive the color.

But the presence of carbonate of lime is not always sufficient to obtain red madder; the physical condition of the soil contributes also to it by the influence which it exerts on the abundance and coloring of its juices. In the department of Vaucluse, on soils very nigh to each other, and of the same mineral composition, is gathered on one red madder, on the other yellow, without our being able to determine the cause which operates on these phenomena. We know, indeed, that the juice, naturally yellow, does not become red, except by being oxydized; but what is the agent which favors in this case, or which arrests in the other the action of the oxygen? In the territory of Orange, in particular, the reddest madder always is produced on dry soils, where the vegetation, always feeble, is interrupted in the summer; but we dare not say that this is the case elsewhere; and we have seen in Trenten (in the basin of the Sorgue, the principal seat of the cultivation of Vaucluse) lands which appeared to us fresh, and which yielded the red madder. Besides, madder at 18 months is always yellow; it reddens more and more as it grows older. That of Levant, which remains many years in the ground, is always of a much deeper color than ours.

But, besides this influence, the soil appears to possess another, which is opposed to the formation of the coloring juices. In certain parts of the valley of Garonne, the attempts at cultivation have only produced grey madder, though the plants had grown vigorously. Did not the plant secrete its peculiar juices the same as do the varieties with red flowers, or were there present deoxydizing agents or substances strongly oxygenated, which have consumed its hydrogen? Observation has not been complete enough to enable us to decide.

We have already mentioned the necessity of the freshness of the soil to prolong the time of the growth of the roots; its want of tenacity is always of great importance; besides, that it produces a considerable diminution of the expense of cultivation. It is necessary that so branching a root, and which buries itself so deeply, should be enabled to penetrate without obstacle deep into the ground. We must then, as much as possible, choose a fresh, mel-

low soil. The excellent marshy grounds of Vaucluse, join to the former quality that of being tilled at all times, and without difficulty, with a wooden shovel, as we might do in a sand or ash heap.

4. *General culture.*

Madder is cultivated in two ways—by the seed and by transplanting. For both, the land must be first prepared. Before winter or in the spring, we work it over with plough, or better, spade it up. In strong soils, subject to retain the moisture of winter and to dry up in the summer, in those which have not been turned up for a long time, the work ought to be deep, to allow the plant a greater space for moisture; but in mellow soils, it is sufficient to work it about 0.25 metre* in depth.

Many cultivators disapprove of deep working, and content themselves with turning up the earth 0.16 of a metre, pretending by this to force the root to form itself nearer to the surface, and thus diminish the labor of drawing out the root. This may answer for land habitually fresh; but cultivation will tend to extend the time in those soils which easily dry up, and the summer cessation of growth of the plant. We must, therefore, balance this loss with the expense of deep working; this result must be attained by experiments in each place of culture. There are fresh, deep soils, where the roots have such a tendency to bury themselves that they go to the depth of 1 metre, and where it would be useful to arrest them by presenting some obstacle; but this is not the case in hard, dry soils. Thus, suppose the soil had had two months' summer repose, and yielding only 1,950 kilog. of roots, and another not having any summer repose, and which yields 3,080 kilog.; the difference of 1,130 kilog. represents, at the mean price of madder, (75 francs the kilog.,) 84.75 fr., or 314 of wheat. Now according to our calculations, to dig 0.25 metre with a spade costs 52 days' work, and in a soil having, by the dynanometric spade, a tenacity of 0.45 metre, and 0.50 metre depth to dig 0.45 metre, requires 269 days. Thus, on the one side we have 52 days' work, costing 310 kilog. of wheat; and on the other, 269 days' work, costing 1,603 kilog., the difference being 1,294 kilogrammes. The advantage of labor of slight depth in allowing the prolonged summer repose is, then, evident in this case. It will be yet more so, if we notice that the price of the day's work is much higher than the mean in the season of the pulling of the root. There are then two things to balance the increase of products and that of cost. In a fresh soil, it is profitable to have the madder grow near the surface; it is not necessary to work in the preparatory labor very deep—0.16 metre is sufficient. In the dry soils it is necessary to dig further, but 0.25 metre is most frequently sufficient when it is left to a longer repose from labor. Deep working is indicated when the madder is very dear and labor at moderate price; but when the reverse is the case, it is necessary to change the course of procedure;

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* A metre is 3.281 English feet.

The manure is buried in the earth by the ploughing which follows the deep ploughing, if it is so ploughed; otherwise, with the first ploughing. After the winter, it receives one or two strokes with the scarificator to finish the breaking of the clods, and then it is harrowed. When there is no supply of manure prepared beforehand, and the ploughing is continued during the whole winter, the same as when oil-cakes or powdered manures are used, these are buried by a light turning up of the ground, done after the winter, and to be followed by scarifying and harrowing.

We then trace with a hand marker the streaks which indicate the breadth of the beds on which the madder is to be planted. These beds are 1.32 metre to 1.65 in breadth, with an alley of 0.32 to 0.40 metre between them. In Flanders, they plant likewise on narrow beds; in Alsace, they allow for them 6 to 10 metres of breadth. We have seen them sown in Carmargue on the whole surface of the field, without divisions, into beds. All these practices ought to be carefully examined.

The tendency of the cultivators of Vaucluse has constantly been to narrow the beds. Formerly, they made them 2 metres broad; they have reduced them to 1.32 metre. They have been guided in this by the observation that madder which grows on the border of the beds is always the most beautiful, and compensates also for the empty space left between the beds; that in weeding, the laborer more easily reaches the noxious plants without leaving the alley, and without treading down the plantation, and principally by the facility of finding in the alleys the necessary earth for the strong hilling up, and by what it affords for drawing out the roots when it has been changed into a trench. Then, indeed, the earth being no more retained on its sides, is cast into the hollow by every stroke of the spade without opposing any resistance; and if it is drawn over by the plough, the slice is also turned over into the trench without any lateral pressure, it is reduced to powder as it falls, and lays open the roots; and finally, if we wish to irrigate, we make the water enter the trenches; it penetrates the earth by infiltration, and renders it easy to begin pulling in a season when the dryness, having hardened the ground, does not allow us to attempt this operation in the greatest number of soils. Now the first madder roots drawn out always sell at the highest price, the manufacturers having noticed that the grindings of summer are better than those of winter. All these reasons concur to make us regard as desirable the multiplying of the alleys, and, consequently, the narrowing of the breadth of the beds.

The culture of the beds having always for their object to furnish the necessary earth for filling up, it may be conceived that if the high price of hand labor and the want of using the plough, in hilling up in Zealand, has caused them to renounce that operation, they are not exposed to lose the land designed for alleys. It might be added that in Camargue, the root's not penetrating deeply into the soil, has been caused, without doubt, from the saltness of the lower strata of the soil, as the reasons, from the more easy pulling in deep soil, do not there exist.

It follows, then, from this examination, that in all soils which are deep, it is best to make the beds narrow, and that they ought to be the narrower the longer we design to leave the roots in the ground without being drawn out, and as more earth is needed for hilling up.

5. *Culture by seed.*

The beds and their alleys having been traced out by the marker, we proceed to sowing. With a hand hoe we open across the breadth of the beds a light furrow, in which a person scatters the seed, which is covered by the earth of a second furrow opened beside the first, and so on till the whole bed is sown. In soils which have not borne madder, and in strong soils, we sow 70 kilogrammes of seed per hectare;* in light soils, on which madder has not been raised, we increase the quantity to 82 kilogrammes; but if they have borne many harvests of this plant, it has been remarked that the seed vegetates poorly, or that the young plants die in greater number, and we use for seed as much as 120 kilogrammes. The seed ought to be covered with from 0.3 to 0.4 metre of earth.

After the preparatory labors, which are so costly, we ought to pay great attention to choose the seed. It is observed that the seed of madder easily loses its germinative powers; for the second year they produce a less number of plants, and become from year to year less susceptible of germinating. The germ of good seed is white. It becomes brown as it grows old. It is the only means which we have to know the goodness of the grain; but when there is time, it is always best to try it, in putting its germination to the test by the means which we have indicated in our article on seed. (10)

If, before the seed is completely up, a heavy rain happens to beat down the earth and form a close crust on the surface, we must without delay pass an iron-toothed rake over it to break it up. In large plantations, we may use instead, to advantage, a roller of wood, furnished with iron points, which may be run over by hand upon the beds, and which produces the effect of raking.

The time for sowing is when the heat and moisture combined are most favorable to the sprouting of the germs. Ordinarily, in Vaucluse, they sow towards the first days of March, and sometimes even in February. The mean temperature is then only 7° to 8°, (or 45° to 50° Fah.;) but the solar temperature 12° to 15°, (or 57° to 60° Fah.) The seed then remains in the ground from 20 to 25 days. At a later period, it germinates more readily, unless it is overtaken by drought, which sometimes happens in April. This fear, which is not wholly devoid of foundation, joined to the facility of obtaining the labor of females, before the time when the silkworms employ the population, have caused the early sowing to be very generally adopted. The white frosts which may occur only retard the plants some days. When one has fresh earth to

* A hectare is 2.471 English acres.

(10) Cours d'Agriculture, vol. 3, p. 440.

cultivate, and has not these reasons to advance the sowing, it can can be done with more, if the mean temperature reaches to 12°, (or 57° Far.) The sprouting will be more rapid, more complete, and the plants more vigorous.

Nothing is more essential for the success of madder than weeding very carefully by hand, which is commenced when the plants are well up. It is repeated as often as it is felt to be necessary. In certain soils, adapted to produce many plants, this is very expensive; and it has been necessary to renounce this method of cultivation in the alluvial soil of Ardech, on account of the vast expense of these repeated weedings, without which our madder fields become quickly immense carpets of verdure.

After each weeding, we take from the alleys a small quantity of earth, well reduced to powder, which is spread over the beds to fill the empty spaces caused by pulling up the weeds. In strong soils, which cannot crumble sufficiently, this may be dispensed with. Besides, the roots of the madder fixed in those soils are not shaken by the operation of weeding.

Before the arrival of the chills of winter, the plants must be covered entirely over with crumbled earth taken from the intervals of the bed. These intervals thus become the trenches, which gradually grow deeper and support the moisture of the plants. The hilling up is also thicker when the earth is light. It is from 0.5 metre to 0.8 metre in thickness. The object of this operation is not, as has been supposed, to preserve the plants from the cold. M. Decaisne, in an excellent memoir on the anatomy and physiology of this plant, (11) has shown what takes place on this occasion. Out of of the earth the stalk only fills itself with green substance, when the juice of the root is yellow, capable of becoming red by the contact of the air; but if the stalk is protected from the influence of the light, and the contact of the earth and moisture, its juices take the yellow color of the roots. Thus, by the hilling up, we increase the vegetable mass charged with the coloring matter, and consequently the industrial product that is sought from it.

The plant thus passes the winter. In the following spring, the weeding must be renewed. If this has been done with care the first year, it occasions little labor. The madder plants are then in possession of the soil, and entirely prevail over all weeds and other plants.

The growth of the second year is vigorous, and, towards the end of summer, the stalks flower and bear seed. When the culture is but of slight extent, and the price of seed is low, it will be found profitable to cut the madder tops green, at the period of flower, in order to feed them out to cattle. In this state, it is a good fodder, equal in quality to the best hay. We cannot judge of it by the amount of the stalk at the moment of pulling. It is then only the straw of madder. As in cutting fodder, the lower part of the stalk is cut, which the contact of the earth and moisture have charged with coloring matter, it has the peculiarity of

(11) Memoires de l'Academie of Brussels, 1837.

tinging the bones of animals which eat it. We frequently see in the slaughter houses of countries where madder is produced, sheep and lambs tinged with this color. As the produce of seed depends on the success of the sowing and vegetation of the plants, we can judge of the weight which we may obtain by that of the fodder cut, and which is nearly the same. The third year we only gather half the quantity of fodder obtained the second year.

The mean price of seed for several years in Vaucluse is 1 franc per kilogramme. In 1816, it rose to 7.50 francs; and since it has varied from 0.60 to 2.50 francs. These variations, and the hope of having a year when the seed would be dearer, have completely abolished the practice of cutting plants in the flower, unless in those high, marshy soils where the flower drops off. It is impossible to fix on the quantity of seed that may be gathered; it depends on the season and the soil. The strong soils yield grain much better than do the light ones, and the harvest is 660 kilogrammes as the medium one. Constant cultivators of madder procure seed by planting roots at the bottom of palisades, or of dead hedges on which they may cling. In this isolated situation, the plants fructify abundantly. M. Bastet has remarked that the stalks of plants which have the most seed, cover themselves in the spring with a viscous substance resulting from the sting of an insect, and that the exhaustion of juices precede the dropping off of the flowers. (12)

The harvest of seed is obtained by mowing the plant at the time of maturity of the berries, indicated by the dark violet color, which they take. The stalks are dried, and, on shaking them with a fork, the berries drop off; these are gathered, and the portions of leaves mixed with them removed; and, when they are completely withered and dry, they are carried to the granary, where care is taken to move them frequently.

The hilling up is done at the end of the second year, as in the former year.

The third year requires no labor till the time when we proceed to pull up the root. Here, two methods are employed—the pulling up by hand, and that of turning them out by a plough.

The mode of taking them by hand, is by means of the spade or hoe. We dig to a various depth, according to that of the roots—from 1 metre to 0.32. In the environs of Monteux, the depth is 0.75 metre. In our mechanical agriculture, (13) we have given the formula, by means of which can be determined the amount of labor necessary for a simple ploughing. We find by this means for that which is 0.75 metre deep in light soils which has not more than 0.050 metre of tenacity, by the dynamometric spade, and which is cut at three successive strokes of the spade of 0.25 metre each, 52 days are required to be multiplied by 3, giving 156 days' work of men. But as at every stroke of the spade the workman is obliged to break the clod and to pull out the roots of madder

(12) Essay on Madder, p. 76.
(13) Cours. d'Agriculture, vol. iii., p. 196, &c.

which are in it, and then to throw them into the heap before him on the ground already dug up, there is a portion of time in delays which experiment shows us is equal to four-tenths of the time employed in digging.

We have then, $156 + \frac{156 \times 4}{10} = 218{,}4$ days' work, or 2,184 hours. If, in the same soil, we are obliged to dig only 0.52 metre, we have for the result 145, 6 days' work. In stronger soils the roots penetrate less deep, and, supposing a soil of 0.030 metre of tenacity which must be dug out 0.50 metre, we have, after the formulas indicated, $269 + \frac{269 \times 4}{10} = 376{,}6$ days' work.

According to these indications, it will be easy to make a calculation for every case, when we know the depth to be obtained and the tenacity of the earth.

At the end of each day, the roots pulled up are gathered into sheets, and then they are carried into the air, where they are dried. In the north, where the benefit of the sun is not enjoyed, we may delay the pulling of the roots till the time when the earth has less tenacity, because the madder is dried in a warm enclosure. The process of drying by means of hot air may be employed, which will shorten the time of the operation, and render it more uniform.

The extraction of the madder by means of a plough requires it to penetrate by a single furrow to the depth in which the roots extend; in operating by two successive cuts of the plough, we cut the roots in two, to the injury of their beauty and equality for merchandise. This kind of labor will not answer, if we wish to penetrate deeper than 0.45 metre. We have seen (14) that it is necessary to reckon for soils of 0.048 metre of tenacity, and of 0.032 metre depth, on a force of ten horses, going at the rate of one metre a second, or that of eight horses, at the rate of 0 80 metre. (15) Suppose that we work on one square hectare, having 100 metres on a side; the alleys of the beds take up 20 metres, and there remains 80 metres in full for labor; and the rows, not being more than 0.20 metre breadth, we have 400 rows of 100 metres length to go over. They require, every one of them, 125 seconds, (going at the rate of 0.80 metre,) and 45 seconds more for turning at the end of the rows, which gives, as the whole time of labor, $(125 + 45) \times 400 = 68{,}000$ seconds, or 18.88 hours, or in fine, 1.89 days. Ordinarily, two ploughs are employed on account of the delay that might be caused by injury to the plough or harness. Care, therefore, should be taken to procure a firm tackling, and to have a change at hand. We have for the price of labor, viz:

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(14) Course of Agriculture, vol. III., p. 178.

(15) We speak here of stout horses. To do this work, we frequently see 18 or 20 mules, more or less feeble.

2 days' work of 3 men, valued at	35.76	kilog. of	wheat.
20 days' work of animals, valued at	110.60	"	"
	146.36	"	"

Men and women are placed along the furrow opened by the plough, thus: a man and woman at every five metres; the men take up the earth raised by the plough, break it in pieces, and the women sort out the roots, which they place in the baskets, to carry them into the common heap. When the root yields but scantily, a greater space is allotted to a couple of laborers. The experiment of one day soon shows the necessary quantity. Supposing that they should be placed at 10 metres distance, we have on 100 metres' length, ten men and ten women, and for the two days:

20 days' work of men....................	119 20	kilog.
20 days' work of women.................	60.00	"
We allow also for the labor of the plough..	146.36	"
	325.56	"

or 88.01 francs, (wheat being at 27 francs the 100 kilogrammes.)

We have seen that in a similar soil, dug to the depth of 0.50 metre with the spade, the labor amounts to 145 days' work, or 864 20 metres of wheat. There is then an economy of more than half in favor of extraction by means of the plough, and which is yet more by the high price of laborers at that period of the year. The work is no doubt more perfect with the spade; there remain less roots in the ground; but all the observations which we have been able to make on these two methods of extraction have convinced us that the small quantity of roots which is left by the use of the plough do not equal the difference of expense, and so that the extraction by hand ought to be reserved: 1st. For soils where the madder penetrates to a greater depth than 0.45 metre, which is the case oftener in light soils which are deep. 2dly. For a field of too small space for the plough to turn in easily, or in which we are obliged to turn too often.

The roots being dried so that they will break neatly without bending, they are put under cover in sheds.

6. *Extraction of roots at eighteen months.*

We have spoken of the extraction of the roots of madder done thirty months after it is sown; that is to say, the second autumn following; but many reasons may lead us not to wait till that time.

The first of these and the most frequent one is the fear lest the rhizoctone (a species of fungus) may attack the madder and destroy it. Wherever we already have experience of the tendency of a soil to produce this detestable fungus, there is no cause for hesitation, especially if it is perceived at the beginning of its invasion in the first year.

But there are also economical reasons which we must examine.

We have said that the root of madder is perennial. We cannot assign any term to its life, and it continues to grow during all the

duration of its existence. This root is composed of an exterior brownish epidermis, which does not contain coloring matter, and which is rubbed off in grinding; then of cellular tissue, and of vessels containing the immediate principle which is deposited between the cells, and always become more abundant in the degree that the root grows older. The successive layers of substance formed immediately beneath, present this principle in a less forward state of purity; but it seems to grow purer the older it grows, and the central layers offer coloring matter of a purer description, or of the *extra fine* quality. The *alizaris* of Levant, which remain a longer time in the earth, bring a much higher price than the roots of Europe. In what proportions do these different parts appear at different ages? According to M. Bastet's experiments, the following proportion is obtained of these parts in the same space of earth at different ages: (16.)

	At 10 months.	At 18 months.	At 30 months.	At 42 months.
In the fresh state	86.000	93.000	100.000	107.000
In the dry state	22.047	24.998	30.609	36.385
Fresh woody substance	7.500	13.950	31.000	66.340
Fresh sap substance	78.500	79.050	69.000	30.660
Dry woody substance	3.285	6.105	13.578	29.057
Dry sap substance	18.762	18.893	16.491	7.328
Proportion of woody to dry sap substance	0.150	0.320	0.820	3.960

These figures are, doubtless, not exact in every case; but as they are the result of direct experiments, they may serve to teach us the advantages and disadvantages of the practice, and explain to us the price which the manufacturers attach to old madder. The second column will serve as a basis for our agricultural reasonings.

Suppose a dry soil in which the weight of fodder of the second year gives us to hope for 1950 kilogrammes of roots at thirty months; if we prolong its period to 42 months, we may hope 2359.5 or 400 kilogrammes more, which will cost:

Manure represented by 88 8 kilogrammes of nitrogen	594 kilog. of wheat.
At the medium price of 73 francs per kilogramme for the 100 kilogrammes, or 278 kilogrammes of wheat, the 400 kilogrammes of roots are worth	1,112 " "
Leaving for the rent of ground	518 " "

The whole question is then narrowed down to ascertaining if the ground rent for a year and the interest of capital expended will be covered by this excess of the crop of 518 kilogrammes of wheat value. In all the dry lands of the south the speculation may be a ood one; and it would appear to be an excellent one in the soils

(16) Bastet Essay, p. 90.

of Asia and Greece, where the period of the madder is much prolonged.

Let us make the same calculations for a madder of 18 months' age. We have supposed that it must yield 1950 kilogrammes of roots in 30 months; we cannot now, therefore, hope for more than 1618.5 kilogrammes. The difference, then, will be 331.5 kilogrammes, worth 921 kilogrammes of wheat.

But we shall have to deduct from this loss:

1. The difference of labor in extraction. The madder being reckoned at only 0.25 metre, in place of 0 50 metre, the saving is expressed by 224 days' work, — 156 = 68 days, and thus	405 kilog.
2. The manure consumed by the plant, (at least 73.6 kilogrammes of nitrogen,) worth	492 "
3. A year of ground rent	x

Now it is evident that 897 kilogrammes $+ x$, is more than 921 kilogrammes. We conceive, then, in the circumstances in which the cultivators of Vaucluse are, their tendency is to pull up the madder at 18 months, notwithstanding the inferiority of price of these young roots, which does not destroy the balance, which is favorable to this operation. They delay the extraction till 30 months only when the current prices are low, and they prefer to wait for its rise, leaving the madder to increase in weight where it is in soils which will pay but little ground rent.

Fresh madder, also, is always sold either to the merchant or manufacturer. It then brings a less price by 75 per cent. than the dry madder. This valuation is nearly exact for madder of 18 months; it will not be so for that of 30 months, which, when it is pulled in a dry time, only loses 0.70 in drying.

We shall now speak of the culture of madder by transplanting.

7. *Transplanting of madder.*

If it is desired to transplant madder, we prepare the soil as for seed, using a quantity of manure sufficient to give the earth what is equivalent to 9.4 kilogrammes of nitrogen for 100 kilogrammes of fresh root, which is to be planted.

The rows are opened with a hoe in the same way as in sowing; then the roots are spread at the bottom of the rows; 1,200 to 1,600 kilogrammes of fresh roots are employed to plant a hectare. The root is then covered up in the same way as the seed, but buried to the depth of 0.6 or 0.8 metre. The cultivation is then the same as for madder of one year old.

Transplanting is a forced method for very porous soils in which the seed germinates badly, and for climates in which the sowing is much retarded. Let us look at the economical result:

The madder plant, bought at its usual price, will cost 2387.50 kilogrammes of wheat, at the price of 275 kilogrammes of wheat for the dry root, and, consequently, of 270 kilogrammes for the fresh root. In this way we balance the following expenses accru-

ing the first year of cultivation, which would have obtained the same quantity:

1. Manure which produces 1,400 kilogrammes of fresh roots, equivalent to 17.5 kilogrammes of nitrogen, valued at.........................	117.25	kilog.
2. Price of the seed, 150 kilogrammes, at 3.7 kilogrammes of wheat..........................	555.00	"
3. The labor of the first year......................	197.16	"
4. A year of ground rent, of which the medium price for the marshy soil of Vaucluse is 888 kilogrammes of wheat..........................	888.00	"
	1757.41	"
Loss................................	1130.09	"

But we have much greater certainty of success, for the seed sown, always very liable not to succeed, comes up scanty, and the young plants are subject to accidents from which those that are already rooted are exempt. The method of raising from the seed, then, always may appear the most advantageous, and the great capital which must be advanced to buy plants, always determines in its favor those cultivators who are not obliged to transplant on account of the nature of their soils or the climate.

Such is the culture of madder. We remark that it dispenses with one ploughing, which it would have been necessary to make at a clear loss in good cultivation, and which is occurred by the extraction of the root. In this deep culture we establish without expense plantations of trees, shrubs, luzerne, sainfoin and roots; grain does not succeed very well until the soil has recovered itself, as takes place after all deep ploughings.

There remains nothing now but to ascertain the price of the return of this important article for our industry.

Account of the culture of a hectare of madder.

FIRST YEAR.

Preparatory.	Light soil. Roots at 0.75 metre deep.	Strong soil. Roots at 0.50 metre deep.
	Kilogrammes.	*Kilogrammes.*
Labor with a spade of 0.25 metre depth, 32 days' work....	310.76; at 45 c., 269 j.,	1603.00
Twice with the scarificator....	15.26	18.00
Harrowing..................	3.07	4.00
Carrying of manure and ploughing at 0.25 depth...........	116.00	144.00
Sowing, eight days' work of men and four of women.........	60.00	60.00
Seed, 82 kilog., at 37 kilog. of wheat..................	303.40; 70 kilog. grain	259.00
Three weedings by hand......	327.00; two weedings ..	218.00

Preparatory.	Light soil. Roots at 0.75 metre deep.		Strong soil. Roots at 0.50 metre deep.
	Kilogrammes.		*Kilogrammes.*
Three hillings up four days' work of men................	71.56;	two hillings up	59.60
Covering in full at the end of the year, ten days' work....	59.60;	12 days' work..	71.52
Manure, 703 kilog. of nitrogen, of which 83.25 kilog. only are taken for the crop......	557.75		557.75
Interest of 619 kilog. of nitrogen superfluous, valued at 4152 kilog..............	415.20		415.20
	2239.60		3410.67

SECOND YEAR.

Interest of the first year.......	223.40		334.98
Two weedings................	88.00;	one weeding...	44.00
Two hillings.................	59.60;	one hilling	29.89
To cover up wholly	59.60		71.52
Interest of 619 kilog. of nitrogen......................	415.20		415.20
	845.80		895.70

THIRD YEAR.

Interest of the two preceding years....................	316.98		424.54
Extraction of the root, 208 days' work....................	1299.28;	376 days' work	2240.95
Interest of 619 kilog. of nitrogen......................	415.00		415.20
	2031.26		3080.70

Recapitulation.

First year	2339.60	3349.87
Second year..................	845.80	895.50
Third year...................	2031.26	3080.50
	5116.66	7325.87

Receipts.

Preparatory.	Light soil. Roots at 0.75 metre deep.	Strong soil. Roots at 0.50 metre deep.
	Kilogrammes.	*Kilogrammes.*
5,625 kilog. of fodder........	823.50; 800 kilog. at 3.7 per kilog......	2960.00
3,750 kilog. of roots.........	104.25; 2297 kilog. of roots.........	6385.60
	11248 50	9345.60
Gain.....................	6131.84	2019.73

We must deduct from this, the ground rent of the land for three years. We have not taken it into the account, because it differs much in another country. In Vaucluse, the mean of the rent of the marshy soils is 1000 kilogrammes of wheat; the strong soils rent at least at 630 kilogrammes of wheat for this purpose, and more if they have never borne madder. The grain will then be reduced to 3131.42 kilogrammes of wheat for the light soils, and at 129 kilogrammes only for strong ones. But it is necessary to consider that the price of labor during the period of the extraction of the madder root is increased one-half besides, which reduces the profit in the first case, and constitutes a loss in the second.

The condition of the proprietors of soils for madder is infinitely better than that of the cultivators, who take the farms on rent:

	Kilogrammes.
Thus, they receive in marshy soils, three years' rent.......	3,000
And they have besides the remainder of 703 kilogrammes of nitrogen in manure....................................	4,710
Without reckoning one ploughing.	
	7,710

or 1661.70 francs; per annum,553 francs 90 centimes.

This favorable condition will probably modify itself, if the cultivation continues to be extended far on the light and marshy soils which we meet on the coasts of the Mediterranean; but even in this case, at least of exceptional circumstances, there remains good profits to those who give themselves to this culture, for the considerable advances which it requires render it impossible for the mass of cultivators, and concentrate it, necessarily, in a small number of hands.

We have seen that madder cultivated in light soils gives a return of:

$$\text{Kilog. } \frac{8116 - 823}{37.50} = 194 \text{ kilog., in place of } 275 \text{ kilog.,}$$

and for strong soils,

$$\frac{7326 \times 1890 - 2960}{22.97} = 272.40 \text{ kilogrammes.}$$

Let us examine now the case where madder has been made without manure on new deep soils which can produce 1280 kilogrammes of wheat per hectare, and which, consequently, contain 97 kilogrammes of nitrogen. The layer from which the wheat draws its substance being 0.25 metre, and that in which madder does so, 0.50 metre in depth at least, we have then 194 kilogrammes of nitrogen at the disposal of the latter plant, and we may hope for a product of 1550 kilogrammes of madder. But, as the lower strata has been less exhausted than the upper, or because the fertilizing principles are more easily assimilated than those of the manure, the product is ordinarily 2000. There would not be more at a second, and afterward at a third crop, because the whole layer would have been reached by the root of the madder, which no longer so easily found a nutriment. We shall then have, as above:

First year.

	Light soil. *Kilogrammes.*	Strong soil. *Kilogrammes.*
Less manure	1266.00	2370.92

Second year.

Interest on the former sum	126.60	237.69
Culture	206.20	145.35
	332.80	383.04

Third year.

Interest on two preceding years	159.80	275.99
Extraction of madder	1299.00	2240.96
	1458.80	2516.95

Recapitulation.

First year	1266.00	2376.92
Second year	332.80	383.04
Third year	1458.80	2516.95
	3057.60	5276.91

Receipts.

3,000 kilog. of fodder	438.60	500 kilog. of seed	1850.00
2,000 " roots	5500.00	1,500 " roots	4125.00
	5938.60		5975.00
Gain	2885.00		698.00

Or 35.30 francs for 100 kilog.; or 47.29 the 100 kilogrammes.

We must add to the expense the value of the rent, which is always higher than that of wheat lands, since the fertility which the plant requires is all drawn from the soil itself. We may reckon at least, on an average, one half more, to wit, 490.50 kilogrammes; and for three years, 1370 kilogrammes. If we add this number to the expense, we have for the madder root:

On light soils.

$$\frac{3053.60 + 1370 - 438.60}{20.00} = 199.25 \text{ kilog., or } 51.79 \text{ francs.}$$

On strong soils.

$$\frac{5276.91 + 1370 - 1850}{15.00} = 319.79 \text{ kilog., or } 80.34 \text{ francs.}$$

But these enterprises of cultivating madder without manure being ordinarily made with the plough, we must examine the price of returns in this case:

First year.

Work with plough of 0.50 metre deep, 60 days' work of beasts, and 20 of men, (volume iii., page 181)	395.70	of wheat.
Two strokes of the scarificator	17.00	"
Harrowing	4.00	"
Sowing	60.00	"
Seed	303.00	"
Two weedings by hand	218.00	"
Two hillings	59.60	"
Covering in full	71.52	"
	1128.82	"

Second year.

Interest on first year	112.88
Weeding	44.00
Hilling	29.80
Covering in full	71.52
	258.20

Third year.

Interest on two preceding years	138.70
Extraction of the root	325.96
	464.66

Recapitulation.

First year	1128.82
Second year	258.20
Third year	464.66
	1851.68

We obtain about—

300 kilogrammes of seed	1110	francs.
1500 kilogrammes of roots	4125	"
	5235	"

The price of the situation of the lands which make a part of the body of the farm, presents only a slight difference from the price of the situation of the wheat lands. We have, then, for three years, 981 kilogrammes to add to the expense, and this gives, as the price of the madder:

$$\frac{1851.62 + 981 - 1110}{15.00} = 114.84 \text{ kilogrammes, or 31 francs.}$$

Thus we have,

	Kilogrammes of wheat.
In light soils, with manure, madder at	194.00
In strong soils, with manure	272.00
In light soils, without manure (hand labor)	199.25
Strong soils	319.79
Medium soils (labor with plough)	114.84

We cannot form a mean price of all these different prices, because these methods of industry do not concur in the same proportion in the market. The medium price of the market, which is 275 kilogrammes, removes from this concurrence strong soils cultivated by hand without manure; it is much easier to obtain that of strong soils cultivated by hand with manure. The only cultures which may yet be profitable are those of light soils and of moderate tenacity, made without manure when they are *new* for madder, (and the number of those who possess such a virgin soil, are reduced every year,) or, indeed, light soils or medium ones, cultivated with plenty of manure; these will stand in the way of the extension elsewhere given to this culture, because by means of a sufficient quantity of manure they may always attain to and surpass the product of land cultivated without manure, especially if we apply to them less costly processes of tillage than those of harnessed machines.

On the culture of rhubarb, (Rheum Emodi,) in Steiermark, by Dr. Hlubek.

[Translated by E. Goodrich Smith, of the Patent Office.]

For a long time, the attempt has been made to obtain the genuine rhubarb on our soil. Manifold experiments have been tried, which have hitherto led to no satisfactory results. The cause of this may, in a great measure, lie in the fact that the seed of the true species cannot be obtained; for even the botanists are not agreed with respect to the species from which the true rhubarb is produced.

According to the concurrent accounts of *Muray*, *Hearsey*, *Royle*, *Timkowski*, &c., the different species of rhubarb grows in the mountainous regions of Chinese Tartary, in Thibet, on the Himalaya, in Nepoul, the Chor mountains, and other regions which are situated high, of northern Asia, without any cultivation, and, indeed, in sandy loam, dry soil, which is perforated by moles and other rodentia, so that it may be kept the looser, and their excrements may furnish manure.

The first and most excellent kind is called the Bucharian; also the Russian, Moscow, and Siberian rhubarb. This, as generally said, is brought from Bucharia and Mongolia into the border and commercial city, Kiachta, in Siberia, in order to obtain in exchange for it Russian fabrics, skins, &c.

Here is appointed by the Russian commission, a druggist, who has a salary, under whose supervision the rhubarb which is destined for commerce is sorted out in the, so called, rhubarb courts, in presence of the producer, by certain laborers; divided into halves, bored into, scraped; that part which is injured cut off; the fungous and perforated roots separated, and all this refuse burned up. These roots, thus sorted out, are then packed in chests, so that all the large, and especially flat pieces may occupy the side and upper layers; the cylindrical or globular pieces have the second place, and the least pieces the body of the chests. The chests are then nailed up, covered over with skins of animals, and sent from Kiachta, across Moscow, to St. Petersburgh.

But the plant which affords the most efficient roots, which is for the most part sent to Europe, DeCandolle describes as a new variety. *Wallich* named it *Rheum Emodi, Don* gave it the name, in his *Flora Nepaulensis*, of *Rheum Australe; Sweet*, finally, not only portrayed it in his British Flower Garden, September, 1828, but gave a good description of it, in which the characteristics are stated as follows:

Rheum Australe, D. Rh. papilloso-asperum foliis cordatio, obtusissimis, planis, petiolis profunde sulcatis, panicula elongata, pedicellis hexagonis verrucosis.

The plant grows on the great plateau of middle Asia, at a height of 11,100 feet above the level of the sea, between 31° and 40° of latitude.

The plant, when in blossom, may be distinguished at first sight from the other kinds by its dark-red blossoms.

The best kind is brought from China, across Kiachta, to Russia.

The foregoing description is adapted to the rhubarb which his imperial highness, the most serene Archduke John, distributed five years ago in the country, for experiments in agriculture, according to the heart-shaped formation of the leaves and the deep-furrowed leaf stem, very similar to the *Rheum Emodi*, but does not agree in many other particulars with the same, and appears to be a new, not unknown kind; on which account I take the liberty of communicating what I have discovered in my four years' experiments and cultivation respecting the kind of rhubarb given me by the Royal Agricultural Society of Steiermark.

Natural historical distinctions.

The seed consists of a marrowy, three-cornered kernel, similar to that of buckwheat, the point of which runs up pyramidally; the dazzling white marrow of the kernel is surrounded by a brownish-red shell, which forms the corners; the pyramidal point, as well as the back end, is in a great measure colored carmine-red; above this kernel, the veil, or hair net, clings by means of the vegetable gum; and this is surrounded with many skins which are spread out into three-wing portions.

If the seed is planted deep, it does not come up. It requires only a covering of $\frac{1}{4}''$ of earth, at a temperature of 18° to 20°, Reaum., and, with sufficiency of moisture, may be germinated in 14 days.

In the cultivation in the open air, the seed springs up in 30 to 40 days from the sowing in the spring, and in 30 days after the snow has melted in the spring, on being sown in Autumn. The autumn is preferable. In the first years, the plants form only 4 to 6 leaves, which wholly wither at the beginning of winter.

In the middle of the April of the second year, and earlier also, according to circumstances—but, then, more certainly, if, in our lofter regions, the White Giant root (*Veratum Album*) has begun to put forth—also the red or pale-red points of the rhubarb appear, which gradually open, and in time put forth 8 to 10 leaves, which are considerably larger than the former year.

In the third year, more and more leaves continually appear, which are of considerable size, and in the course of sixty days the plants put forth stalks and begin to blossom.

Usually, toward the middle of June, the white blossoms appear in the upright shrubs, in which the flowering buds are seated; these, open, each bud forms a flower of six leaves, a style, and seven stamens. After the fruit has made its appearance, the flowers are of a light yellow color. In the upper part, which are last developed, the anthers are colored carmine red.

The seed reaches to a perfect ripeness after five to six weeks from the period of blossoming, and many plants bear over twenty thousand seed.

The root of the rhubarb is carrot-shaped; the knots from which

the root leaves spring are on the highest part of the same, as in all such kinds of vegetable roots. In young roots, the knots are only furnished with a germ, in which, in the case of the older roots, especially, in a good soil, more germs are always produced around the knots.

The tap-root, after the knots, is the most useful part. On the root there are small projecting, warty streaks running across, and many fine fibres, which serve as conductors of nutriment from the earth.

The root itself is enclosed in a fine yellow skin, which can be pealed off; beneath this is found a second skin, which is somewhat thicker, not more easily to be separated, and grows with the other layers of the tissues; the interior is of different layers of tissue, which are formed from the outward portion of the root towards the interior. The later roots are first whitish yellow, and become yellower the older they are; so that, with the younger roots, we may observe a broad ring from without, which becomes more and more lost, the older the root is, and thus the more it is formed out. If we taste the roots in the summer, every month, the close observer will find that the taste, from time to time, changes, and that at the time when the leaves begin to wither, and the seed to fall off, the root appears to be most bitter; therefore, the harvest should be at this period, because the root contains the largest quantity of the peculiar bitter of the rhubarb; but the root attains the highest degree of perfection at a height of 3.000′ to 4.000′, at first, in eight to ten, and at a height of 4.000′ to 7.000′, in fifteen to twenty years.

Cultivation.

Our courage, as to the planting of rhubarb, falls, when we reflect that in its native land it succeeds at a height of 7,000 to 11,000 Vienna feet, and in our country, at a height of 7,000 feet, produces only a scanty vegetation. In a word, we see ourselves limited in the cultivation of rhubarb to a height of from 3,000 to 5,000 Vienna feet.

But as not every one who may be occupied in the cultivation of this plant has a scale of height, so I believe I must determine their successful place of growth, in respect to elevation above the level of the sea, by means of the following plants of wild growth.

In the height at which grow *veratrum album*, (white giant weed—popular name, Hemer,) *arnica montana*, (mountain wolf's bane—popular name, Kraft-wurzel,) *geum montanum*, (spikenard root—popular name, Benedict root,) the rhubarb may be cultivated with certainty.

Rhubarb requires a free, open place of growth, for no plant strives to get at the heat so much as this. The great plateau of middle Asia, especially the deserts of Schamo Gobi, as the greatest convex point of our planet, appears to be adapted to produce this admirable plant; but as we have no plateaus of this kind, we therefore place the rhubarb on the declivities of the mountains which

do not incline lower than an angle of thirty degrees, and especially those where grow the *ajuga reptans*, (the creeping Günsl—popular name, cuckoo flower,) which, on account of its bitterness, the countryman uses as a remedy for the gout and a tonic for strengthening the digestive powers; or *gentiana lutea*, (yellow gentian,) which usually spread over the middle regions of the Alps; or where is to be found *rheum monachcrum*, (or rumex alpinus,) monk's rhubarb. In general, rhubarb requires a loamy clay soil, which is composed of one-half of sand and the other of clay and other constituents, such as lime, humus, &c. A very tight, wet soil is not adapted to it, as the large leaves show, by which the plant attracts much moisture from the atmosphere, and at the same time keeps off too much moisture from the root, in consequence of a fall of rain. The results of the experiments which I have tried with rhubarb on different sorts of soil are the following:

1. On humose soils, the plants appear very luxuriant, the leaves attain considerable size, the number of the root fibres are quite large; on the other hand, no proportioned carrot-like tap root is formed. The roots themselves are spungy, hollow and a little aromatic, and thus a humose soil does not answer for the culture of the rhubarb.

2. On clay slate which has felt the influence of the weather, the plants grew at first very luxuriantly; but in continued drought are all withered up.

3. On wood clearings, with old trunks of trees, the plants appeared luxuriant, and held out through the winter; the soil was sandy loam; sub soil, gneiss—in some spots, granite.

4. On burned places of similar composition, on which the seed was scattered in autumn, the plants grew finely, and did not suffer from mice, which are very fond of the rhubarb seed.

5. On loamy clay soil, of alluvial formation, the plants succeed very well, and acquire a fine smooth root.

6. In the vicinity of alum mines the seed came up, but the plants soon perished.

From what has been mentioned, it follows that rhubarb requires a free, open situation, is fond of a dry, sandy, loamy soil—that it demands a period of from eight to ten years, at a height of from 4,000 to 7,000 feet, till the root is so far formed as to yield a useful article of commerce. But that in the last named height, electricity exerts a very important effect on the plant, every one must allow who has had opportunity to see the extraordinary freshness of the plant, after being subjected to the weather at such a considerable height.

The root harvested in autumn must be cleansed from the earth—not washed—the outer skin drawn off, in which the inner skin must not be injured, cut into pieces, hung on threads, and dried at an artificial warmth of 30° Reaumur. The drying in the open air is not to be advised, as the root continually attracts moisture, like a strong hygroscopic body.

State of my planting in Belden.

At the end of the month of July, 1844, I produced from a three years' stock the seed of rhubarb, and immediately, in October of the same year, laid in the seed bed 1.800 grains, which, for the most part, came up in the spring of 1845, which I caused to be transplanted towards the end of March into the beds. More than half of the roots were eaten in the winter by mice, because the young roots do not contain the bitter principle; I transferred the remaining ones, 830 pieces, to a limestone sandy-loamy soil, which had a western exposure, and an inclination of about thirty degrees on an average, into rows, so that there were about nine square feet allotted to each plant.

The plants, kept as clean as possible, grew tolerably well, but during the burning heat many leaves fell off; yet the roots remained fresh, and after a rain put forth new leaves. The whole plantation occupied 210 square rods, so that one square rod was allotted to four plants. As in the first year thirty plants were lost, there remained in place the second, 800 pieces. In the autumn of 1845, I placed in a ploughed ground, the exposure of which was toward the north and northwest, and partly having an inclination of thirty to forty degrees, 2,400 grains; the sward was dug up and turned in the form of rows, the intervals of sward remaining between the furrows being the breadth of a foot. By the protracted drought, about 1,000 plants perished; the number of plants remaining being 1,400, on a space of 400 square rods.

These two plantations in Belden lie in 47° 2′ 16″ north latitude, and nearly 30° longitude from Ferro, at a height of 3,200 teet; and they at present exhibit a favorable appearance, so that we may hope that the effort of his imperial highness our serene elector and president, to establish the culture of rhubarb in our country, will be crowned with excellent success.

APPENDIX No. 8.

STRAWBERRY CULTURE, GRAPE CULTURE, &c.

Strawberry statistics of Cincinnati.

By Charles Cist, Esq.

As Cincinnati has for several years enjoyed a high reputation for the abundance and excellence of its strawberries, I have thought the statistics of this article might interest your readers.

Four thousand bushels of this berry were raised in this vicinity and sold in our market houses during the season of 1845, which was rather an unusually productive one. Twenty per cent. must be added as the quantity delivered at steamboats, hotels, private dwellings, and confectionaries, or sold at stands or agencies in various parts of the city. In 1846, this quantity was increased to four thousand two hundred bushels, with an addition of twenty-five per cent. to the sales specified above. This was a cold and wet season, and unfavorable to their growth—the increase in quantity springing from supplies afforded by newly bearing patches, which are added every year in the vicinity. In 1847, the first ascertainment of daily sales was commenced; it has been continued in 1848, and the table follows:

1847. Dates.		Bushels.	1848. Dates.		Bushels.
May	24	10	May	19	6
	25	15		20	15
	26	20		22	20
	27	20		23	30
	28	40		24	60
	29	50		25	75
	31	50		26	198
June	1	296		27	313
	2	250		29	211
	3	50		30	450
	4	249		31	589
	5	489	June	1	307
	7	200		2	352
	8	514		3	310
	9	411		5	145
	10	237		6	450
	11	250		7	418
	12	385		8	260
	14	100		9	244

1847. Dates.		Bushels.	1848. Dates.		Bushels.
June	15	321	June	10	156
	16	220		12	60
	17	176		13	80
	18	151		14	50
	19	55		15	30
	21	12		16	20
	22	5		17	10
				19	6
		4,576			4,965

In 1847 and 1848, large quantities were sent off by railroads; and for the last three years additions must be placed to the quantity sold at hotels, steamboats, private dwellings, confectionaries, &c., in the consumption of strawberries on the spots where they are raised, by pleasure parties from Cincinnati and other places in their vicinity. I should put down the entire product of the strawberry, therefore, in 1847, at 6,500 bushels, and in 1848 at 7,000 bushels; each successive year increasing the proportion of strawberries sold directly to purchasers at their homes, &c., over that disposed of in markets.

It will be observed that the Monday of each week exhibits lighter sales than the previous Saturday or succeeding Tuesday. In general, however, these tables present a regular ascending and descending grade of production during the twenty-six days which ordinarily constitute the season. What disparity in supplies exists, is occasioned either by the weather being unfavorable for gathering, or very heavy stocks so reduce the price as to make the expense of gathering too great to be profitably borne at current rates of sale.

The strawberries are brought in cases of five to eight drawers, each drawer containing thirty or forty quarts, which lie an average depth of two or two and a half inches. They are delivered in Cincinnati in time for sale as early as four to five o'clock in the morning, when disposed of at the market houses. A considerable share are sold in tin boxes of a quart each, or wooden ones of two quarts each, which fill up the same kind of drawers. These usually command a better price, not only on account of more perfect keeping of the article, but because they measure out more than when filled into the ordinary quart measure.

In former years they were brought in wagons. I once saw a four horse wagon backed up to our market with *two tons of strawberries*, packed in cases of drawers.

We cultivate strawberries here with reference to their sexual distinctions, and find this treatment very successful.

A good pistulate or female plant is selected, such as the Hudson or Hovey's seedling, and the plants set out in rows 15 inches apart, and the rows about 15 inches from each other; then a path two or three feet wide; then a row of male or staminate plants, such as will bloom about the same time as the female; and then a path as

before. Then another bed of three rows of female plants, with paths and rows of male plants, until the patch is completed. The object is to keep the male plants separate from the female, so that the latter shall be impregnated without being overrun by the male. This can easily be done by hoeing the latter when they run into the paths.

In field culture, the plants are set out in rows eighteen inches or two feet apart from each other, and a male for about every ten or twelve female plants—all in the same row. Either one or two rows are planted in this way, leaving three feet between the lands, or room enough to plough and keep them clean. They are cultivated with the plough between the lands or beds, and with the hoe in the beds, to keep down the weeds and grass.

Field culture.

The lands or beds clear across the field—beds 3 feet wide, then a furrow.

= = = = = = = = = = . = = = [bed.] = = = . = = = = = = = =

[furrow.]

= = = = = = = = = = . = = = [bed.] = = = . = = = = = = = =

[furrow.]

= = = = = = = = = = . = = = [bed.] = = = . = = = = = = = =

[furrow.]

Plants from 18 to 24 inches apart in a single row; every tenth plant, male.

Garden culture.

[Path 3 feet wide.]

[Female bed, with three rows of pistillate or female plants.]

[Path.]

[Male bed, with one row of staminate or male plants.]

[Path.]

[Female bed, with three rows of pistillate or female plants.]

[Path.]

[Male bed, with one row of staminate or male plants.]

[Path.]

[Female bed, with three rows of pistillate or female plants.]

[Path.]

Earliest, as in the order of ripening: 1st. Early Scarlet—tart but high flavored, requiring much sugar. 2d. Necked Pine—highest flavored. 3d. Hovey's—sweetest variety in general culture, requiring but little sugar. 4th. Hudson—firmest, and best adapted for carrying to market. There is cultivated here about as many of the latter variety as of all the first three named, or, I might safely say, *all others*.

The largest berries produced at the Cincinnati Horticultural Society have been from Hovey's, but the general average of the whole crop, as to size, would probably be in favor of the Hudson.

Our horticultural society has stimulated a spirit of improvement that has afforded specimens of extraordinary size and quality otherwise. Strawberries measuring five to five and one-quarter inches in circumference have been repeatedly exhibited at its exhibitions or fairs. In one or two instances specimens have been exhibited reaching to five inches and three-quarters in measurement.

The prices of strawberries vary, of course, with the character of the season and the different periods of sale. They usually open at 20 to 25 cents per quart, a price which they command only for a day or two, and soon fall to 15, $12\frac{1}{2}$, 10, and $8\frac{1}{3}$ cents. When abundant, they command 5 to $6\frac{1}{4}$ cents, and occasionally fall to 3 to 4 cents.

The season sales will not average higher than 7 cents, unless the season itself has proved unfavorable. I know of no year in which strawberries have averaged as high as 10 cents per quart.

At least two thirds of the strawberries sold here are raised on the banks of Licking river, a few miles above its mouth, which is just opposite Cincinnati. This affords the facility of water carriage, obviously of great advantage to the transportation of ripe fruit of a character so delicate as the strawberry. The entire quantity of ground on both sides of the Ohio which supplies this market cannot be short of two hundred and fifty acres. Much of this

is in small patches of one, two, three, or five acres, the smaller the spot, in general, the more productive (proportionally) being the yield. One of the Culbertsons, a family which raises more largely of this berry than any other, has some sixty acres in three patches. One of these comprehends a field of thirty five acres.

Just as the supply of strawberries is through in this market, it is succeeded by that of the raspberry, which, in the course of a few years, will probably be raised to equal extent. At present, the supply of raspberries is about one sixth that of strawberries. They are of vari us species—the cane, yellow, black, red Antwerp, and ever-bearing; of these, the red Antwerp is the general favorite. Raspberries average $18\frac{1}{3}$ cents per quart, during the season.

The raspberry culture of 1847 is as follows:

June 19	30	bushels.
" 21	14	"
" 22	81	"
" 23	95	"
" 24	55	"
" 26	100	"
" 28	40	"
" 29	85	"
" 30	50	"
July 1	30	"
" 2	18	"
	598	"

This includes only what is sold in our markets.

I cannot close this article without referring to the moral aspect of the cultivation of these fruits on such an extensive scale as to bring their use within the reach of every individual, how limited soever his means.

In our Atlantic cities, and still more in Europe, these articles command a price which denies their use to thousands whose appetites they tempt, and for whom they would form a wholesome refreshment in seasons of sickness for themselves or families. I need not point out the bitter feelings towards the rich which such and other privations engender in the minds of these masses. Whatever tends to remove such distinctions in society, and place enjoyment and comfort alike within the reach of all the industrial classes, is so much gained to the general happiness of society at large. No man in Cincinnati feels that he cannot afford to buy his family everything which is sold in its markets.

Cincinnati, *February* 12, 1849.

I send you, in hope it will be in time for your report, what I know would be better prepared by its writer, Robert Buchanan, esq., one of our best horticulturists, than could be possibly

done by myself, a practical and reliable article on the grape of the west, and its wine product.

I add one explanation, as comment, only. Mr. Buchanan has overstated the expense, and understated the profits, through a desire not to mislead any person who might desire to enter into the grape culture. Many of his suggestions derive great value from the fact that they indicate a variation from the treatment of the grape in the wine countries of Europe, which is necessary to success here. One great object in Germany and France is to expose the fruit as much as possible to the drying and ripening influence of summer heat; while here they need nothing of the kind, by extirpation of the leaves or otherwise, the arid character of our summers being rather injurious than the reverse.

Very respectfully, yours,

CHARLES CIST.

Hon. Eemund Burke.

Cincinnati, *February* 10, 1849.

Dear Sir: At your request, I now give you the mode adopted by myself, and some others in this vicinity, in cultivating the vine for wine-making.

At the same time, I feel that it would come with greater propriety from Mr. Longworth, to whom, more than to any other man in the west, we are all indebted for our knowledge in grape culture.

Selecting and preparing the ground.

A hill side, with a southern aspect, is preferred. If the declivity is gentle, it can be drained by sodded, concave avenues; but if too steep for that, it must be benched, or terraced, which is more expensive.

In the autumn and winter, dig or trench the ground with the spade all over two feet deep, turning the surface under. The ground will be mellowed by the frosts of winter.

Planting.

Lay off the ground in rows, 3 by 6 feet; put down a stick, 12 or 15 inches long, where each vine is to grow.

The avenues should be 10 feet wide, dividing the vineyard into squares of 120 feet. Plant at each stick two cuttings, separated 6 or 8 inches at the bottom of the hole, but joined at the top. Throw a spade full of rich vegetable mould into each hole, and let the top eye of the cutting be even with the surface of the ground, and, if the matter is dry, cover with half an inch of light earth.

The cuttings should be prepared for planting by burying them in the earth immediately after pruned from the vines in the spring; and by the latter end of March, or early in April, which is the

right time for planting, the buds will be swelled so as to make them strike root with great certainty. Cut off close to the joint at the lower end, and about an inch in all above the upper.

Pruning.

The first year after planting, cut the vine down to a single eye, (some leave two;) the second, leave two or three; and the third, three or four. After the first year, a stake $6\frac{1}{2}$ or 7 feet long must be driven firmly down by each plant, to which the vines must be kept neatly tied with willow or straw as they grow. Late in February, or early in March, is the right time for spring pruning in this climate.

Summer pruning consists in breaking off the lateral sprouts and shoots, so as to leave two strong and thrifty canes or vines—one of which is to bear fruit the ensuing season, the other to be cut down in spring pruning to a spur to produce new shoots. These may be let run to the top of the stakes, and trained from one to the other, until the wood is matured, say in August or September, when the green ends may be broken off. One of these vines is selected next spring for bearing fruit, and cut down to 4 to 6 joints, and bent over and fastened to the stake in the form of a bow. The other is cut away, as well as the fruit-bearing wood of the last year, leaving spurs to throw out new wood for the next, and thus keeping the vine down to within $1\frac{1}{2}$ to 2 feet of the ground. Nip off the ends of the fruit-bearing branches two or three joints beyond the bunches of grapes, but do not take off any leaves.

If both the cuttings grow, take one up, or cut it off under ground, as but one vine should be left to each stake.

Culture.

The vineyard must be kept perfectly clean from weeds and grass, and hoed two or three times during the season. Keep the grass in the avenues around down close. About every third year, put in manure, by a trench the width of a spade and three or four inches deep, just above and near each row; fill in with two or three inches of manure, and cover it up with earth.

Wine-making.

Gather the grapes when very ripe, pick off the unsound and unripe berries. The bunches are then washed in a washing tub, or passed through a small mill, breaking the skin, but not the seed, and thrown into the press, and the screw applied until the skins and seed are pressed dry.

Fermentation.

This process is very simple. The juice is put into clean casks in a cool cellar, and the casks filled within about four or five inches of the bung, and the bung put on loosely. The gas escapes,

but the wine does not run over. In from two to four weeks generally the fermentation ceases, and the wine clears; then fill up the casks and tighten the bungs. In February or March, rack off into clear casks. In the spring, a moderate fermentation will again take place; after that, the wine fines itself, and is ready for bottling or barrelling. Use no *brandy* or *sugar*, if the grapes are sound and well ripened. Keep bunged or corked tight, and in a cool cellar, and the wine will improve by age for many years.

R. BUCHANAN.

Mr. Charles Cist.

Statistics.

Cost of my vineyard of six acres—fourteen thousand four hundred vines:

Trenching, two feet deep, $65 per acre	$390 00
Sodding avenues	60 00
Cost of 30,000 cuttings, at $2 50 per thousand	75 00
Planting "	70 00
Fourteen thousand five hundred locust stakes, at $3 per hundred	435 00
Setting 14,500 stakes	55 00
	1,085 00

Cost of attending the first year*—vine dresser, $216, and a hand for one month, $15	$231 00
Second year—vine dresser, $216, a hand for two months, at $15 dollars per month	246 00
Cuttings after first year to replace failures, say	20 00
Hauling, carting, &c.	68 00
Contingencies, &c.	150 00
Average cost, say $300 per acre	1,800 00

The third year the vines will produce grapes enough to pay the expenses of that year—generally, more.

For the fourth year, and a series of eight or ten years in succession, the experience of the past would indicate the following calculation to be something like a fair one:

Say, six acres, average $250 gallons, at rates heretofore, $1 per gallon		$1,500 00
Deduct cost of vine dresser per annum	$240	
Assistance, hoeing, &c.	60	
Gathering grapes and pressing	150	
		450 00
Net profit per annum		1,050 00

* The hands board themselves.

To attain this, the vineyard must be favorably situated and well attended by a competent vine dresser, and free from the disastrous visitation of the rot.

Vine culture in this vicinity.

It is estimated that over three hundred acres are now planted with the vine within a circuit of twelve miles round Cincinnati; nearly two-thirds of which were in bearing last year, producing, notwithstanding the rot, so injurious to many, about 50,000 to 60,000 gallons of wine.

The Catawba is our *great* wine grape, and principally cultivated. The Cape is next, but few are planted. The Isabella is not profitable for wine, and is only raised for table use.

Mr. Longworth, with unwearied zeal and liberality, is still experimenting with new varieties, and may yet find a rival for the Catawba.

R. BUCHANAN.

Mr. Charles Cist.

N. B.—Some vineyards, in good seasons, have produced at the rate of 500 to 800 gallons to the acre; but this is rare. The usual yield is 300 to 400 gallons, when there is but little rot. A bushel of grapes, if well ripened, will produce three and a half to four gallons of wine.

By proper economy, a man may have a vineyard of several acres in a few years, without feeling the expense to be burdensome. Commence by trenching one acre in the winter, and planting it out in the spring; next year another acre, and so on, for five or six years. After the third year, he will have his own cuttings from the first acre, and also grapes enough to pay for the cost of planting the succeeding additions to his vineyard.

If he has suitable timber on his own land, the stakes can be got out in the winter with but little outlay in money. By this course, the cost of a vineyard of six acres would not be half as much as mine.

Some prefer planting in rows, four by five; others, four and a half by four and a half; and, on level land, three and a half by six, or even seven feet.

I have merely given, in the foregoing remarks, the course pursued by myself and some of my neighbors, without pretending that it is preferable to others.

R. B.

APPENDIX No. 9.

DAIRY.

A. L. Fish's report on cheese to the New York State Agricultural Society.

LITCHFIELD, HERKIMER COUNTY, 1847.

DEAR SIR: At your earnest solicitation, I have attempted to give a condensed account of my observation and experiments in cheese making for several years past; in which I cannot be as brief as may be desired, and allude to the variety of circumstances which have a bearing upon the intricate science of cheese making.

Having been engaged personally in 1845, in some sixty dairies, which were located in thirteen towns and four counties, and more or less in the same manner the past two years, I have observed a marked difference in the capacity of soils for producing herbage, under different modes of culture, and the various conditions and treatment of cows, affecting their capacity for milk, both as regards quality and quantity. The inconvenient and improper fixtures, in many instances, for making and curing cheese, which are to be found, all unite in convincing me that any set rules for making cheese would not be practicable, even with the most proficient cheese maker; because—

In the first place, milk is a very sensitive fluid, and liable to be varied in quality by impure water, damp and unventilated stables, change of diet, excess of feeding, excitement of temper, irregular milking, salting, &c., which destroy its susceptibility to produce like practice.

2d. Cheese, when pressed and exposed in a curing process, is no less sensitive, and equally liable to be varied in texture and flavor, by size of cheese, exposure to excess of heat, bad air, &c., the effect of which I shall hereafter notice. There are, however, leading principles which form the basis of operations, and should be closely adhered to in all cases in the process of manufacturing cheese. Salt, rennet, heat, and pressure are the principal agents used in converting milk into cheese, the flavor and texture of which is determined by their proportionate use. The proportion is varied by different dairymen, according to their notions of propriety, as best adapted to their fixtures, experience, &c. Hence arise the great inequalities in dairies in the same neighborhood, and even in the same dairy rooms may be found as many different qualities of cheese as there are of fruit in an apple orchard. Some of these are matured at an early period, while others mature later, and are unsuited to the same market.

Much of the cheese being contracted for before it is made, (in the early part of the season,) both buyer and maker are liable to

be disappointed in the cheese being suited to the market for which it is designed, destroying the confidence of purchasers, and injurious to the best interests of the dairyman. It is, therefore, necessary that makers should have sufficient knowledge of the science to determine the result of their practice, which cannot be learned from verbal instruction. It is by practical experience and close observation only, that the maker can learn to adapt his practice to the frequent and extreme changes to which our climate is subject, varying the quality of the milk, and materially affecting cheese in process of curing.

I will suggest a plan (in the following table) of keeping a dairy book, or memorandum of each day's practice, which I have adopted in my dairy for several years past, and which has greatly enabled me to investigate the science of cheese making, being a table illustrating the experiments made by me the past season:

DAIRY DIARY.

Date.		No. of cows in milk	No. of gallons of milk.	Heat of milk at setting.*	Time of curding, in minutes.	Time of breaking, in minutes.	Time of heating up.	Scalding heat.	Time scalded, in minutes.	No. of teacups of salt.	Quality of the curd.	Kind of weather.	Press'd w'ght green marked on the bandage before greasing.†	No. of cows bulling or in heat.	Cheese huffed or cracked.	Days old when huffing or cracking commenced.
April	21	42	102	90°	80	60	50	100°	40	$6\frac{1}{2}$	Sweet.....	Cool; stormy ...	109	......	Soured	10
	26	42	105	90	20	30	40	100	25	$6\frac{1}{2}$	...do.......	Fair	104	......	Huffed	3
May	6	42	106	90	50	40	40	100	60	6	...do.......	..do............	104	......	Baked; huffed...	20
	8*	42	103	90	50	40	40	100	60	12	Sour........	.do............	108	......	Sour and hard ..	30
	21	43	142	90	60	75	50	101	45	12	Sweet	.do............	153			
June	6	44	158	88	60	75	45	102	40	14	...do..	Rainy	185	6	Huffed	20
	16	46	165	86	55	60	35	102	45	16	...do........	Fair	196			
	18	46	155	86	45	50	30	102	50	14	...do	.do............	174			
July	10	50	160	86	40	55	30	103	40	14	...do........	..do............	175			
	20	50	140	86	40	50	40	104	60	13	...do........	..do....	154			
Aug.	10	50	12[illegible]	86	50	30	30	100	30	10	Sour........	Thunder; wet ..	123	......	Soft	
	17	50	118	90	50	30	30	100	40	12	Sweet......	Fair	128	......	Hard	
Sept.	10	50	120	88	40	30	50	104	45	10	...do........	.do......	128			
	20	50	116	90	40	50	40	104	40	10	..do	.do............	125			

* In this case it was found impossible to harden the milk with rennet or heat, owing, undoubtedly, to excess of fermentation from feeding barley meal, and sudden change from cool to hot weather. A change to oat meal and shorts was an effectual remedy.

Remarks.—Average weight of cheese per gallon of milk, in April, $1\frac{1}{8}$ lb.; average per day per cow, $2\frac{2}{3}$ lbs.; shrinkage in 60 days, 10 per cent.; cows kept to hay, with whey and 2 quarts of provender, soured in slop, for each cow. Cured quick and tainted. Leaked oil at 90 days old. Average weight of cheese per gallon of milk, in May, 1 1-16 lb.; average per day per cow, with the feed as in April, 3 1-49 lbs.; till May 15, turned to grass; shrinkage in 60 days, 9 per cent. Average weight per gallon, in June, 1 1-30 lb.; average per day per cow, $3\frac{3}{4}$ lbs.; fed no grain in June; turned into fresh feed June 18. Commenced feeding sowed corn the 15th. Average weight, in August, per gallon, 1 1-17 lb.; average per cow, $2\frac{1}{4}$ lbs. per day; fed no grain. Average weight per gallon, in September, 1 1-14 lb.; average per cow, $2\frac{1}{4}$ lbs. October 10—Commenced feeding apples, raw; on feeding plentifully milk was rank flavored, with increase of quantity, the curd tough and corky, and cheese inclined to huff; taking apples from them and feeding shorts was a quick remedy. On turning to apples again, the same effects were perceived; and I have noticed the same results for several years on feeding plenty of raw apples or excess of other food, producing too rapid fermentation in the stomach and stinking breath from the animal; hence the impropriety of frequent change from scant to flush of feed, it being sure to reduce the quantity of milk, as in June 18, in the table above.

†Let the date of making each cheese be marked on the bandage with common ink before it is greased, and a ready reference can be had from that to the schedule, at all times, and the result of any variation distinctly marked. A slate and pencil, hanging near the cheese tub, to mark every day's practice, it will not cost much time, and is easily transferred.

The evening's and morning's milk is commonly used to make one day's cheese. The evening's milk is strained into a tub or pans and cooled to prevent souring. This is done by running water through a vessel set in the milk, or setting pails filled with cold water into the tub, and stirring till cool; but little cream will rise over night.

The cream is taken from the evening's milk, and kept till the evening's and morning's milk are put together, and warmed to receive the rennet. This is often done by heating a part of the evening's milk to a temperature that will warm the whole mass. Both are objectionable, because the natural affinity which is necessary to preserve between the constituent parts a perfect coherence is destroyed, by a portion of the milk being overheated. It is better to warm the whole mass in a manner that will produce an equilibrium of heat, which is best done by placing the vessel containing the milk within a larger vessel, with two inches under the bottom, and one inch of space at the sides, into which space water may be put to cool the milk, and into which steam may be let to warm the milk and scald the curd. The more water surrounding the milk, the more uniform will be the heat. The cream, if added, (which is generally done,) is best incorporated with the milk, by putting it with twice its quantity of new warm milk from the cow, and add warm water to raise its temperature to ninety-eight degrees. Stir it till perfectly limpid, add cream to milk, and then put in rennet, that the same stirring may mix both at once with the mass. If milk is curdled below eighty-four degrees, the cream is more liable to work off with the whey. An extreme of heat will have a like effect.

Curdling heat is varied with temperature of the air, or the liability of the milk to cool after adding rennet. (See table, April and June.) A fine cloth spread over the tub while the milk is curdling will prevent the surface from being cooled by circulation of air. No jarring of the milk, by walking upon a springy floor or otherwise, should be allowed while milk is curdling, as it prevents a perfect coherence.

Rennet.—Various opinions exist as to the best mode of saving rennet, and that is generally adopted which is supposed will curdle the most milk. I have no objection to any mode that will preserve its strength and flavor, so that it may be smelt and tasted with good relish when put into the milk. Any composition not thus kept I deem unfit for use, as the coagulator is an essential agent in cheesing the curd, and sure to impart its own flavor. The rennet never should be taken from the calf till the excrement shows the animal to be in perfect health. It should be emptied of its contents, salted and dried, without scraping or rinsing, and kept dry for one year, when it will be fit for use. It should not be allowed to gather dampness, or its strength will evaporate. To prepare it for use, into ten gallons of water (blood warm) put ten rennets, churn or rub them often for twenty-four hours, then rub and press them to get the strength, stretch, salt and dry them as before. They will gain strength for a second use, and may be used when

the weather will admit of soaking them to get the full strength. Make the liquor as salt as can be made, strain and settle it, separate it from sediment, (if any,) and it is fit for use. Six lemons, two ounces of cloves, two ounces of cinnamon, and two ounces of common sage are sometimes added to the liquor to preserve its flavor and quicken its action. If kept cool in a stone jar, it will keep sweet any length of time desired, and a uniform strength can be secured while it lasts. Stir it before dipping off to set milk, take of it enough to curdle milk firm in 40 minutes. Squeeze or rub through a rag anatto enough to make the curd a cream color, and stir it in with the rennet. When milk is curdled so as to appear like a solid, it is divided into small particles, to aid the separation of the whey from the curd. This is often too speedily done, to facilitate the work, but at a sacrifice of quality and quantity.

The three indispensable agents, heat, rennet and pressure, rightly applied, must keep pace with each other in effect. The two former operating to subdivide, the latter to aid cohesion, by bringing the particles of a sameness closer in contact. This should be skilfully and studiously applied in a mild way, according to the capacity of the curd to receive it. The less friction in working the curd, the less waste. If heat is raised too fast, or commenced while the curd is too young, the effect of the rennet will be checked, and decomposition will not be complete, and will result in a leaky cheese.

This often happens when steamers are used in small dairies. Heat may be raised in scalding to keep pace with rennet; if the rennet is quick, heat may be raised quick—if slow, heat must be raised slow and held longer. (See table, April 24 and 26.) Scalding heat may be carried from 96 to 104 degrees, according to the size of the cheese, and temperature to which the cheese is exposed. During the process of scalding, the whey and curd should be kept in motion to prevent the curd from settling and sticking together, as separating it is attended with great labor and waste from friction.

When the curd is cooked so that it feels elastic, and will squeak when chewed with the front teeth, it is separated from the whey to receive salt. This is done by dipping it into a strainer over a basket or sink, or drained off and salted in the tub. Either may be done without adhering in lumps, by stirring it in a small portion of whey, till cooled to 94 degrees. This is the most critical part of the process, where cheese makers are most likely to err, as the portion of salt retained in the cheeese after pressing will be in proportion to the capacity of curd to receive it when added. At a particular period and temper of curd when draining off whey, it will absorb salt freely, and after being thoroughly mixed and packed up for a few minutes while warm, it will be evenly shrunk and cleansed by salt and whey, and will press out freely; but if the curd is *not well cooked*, or cooled too fast in draining off whey, it will acquire a degree of stubbornness, prevent the absorption of salt to shrink and cleanse, and *no amount of pressure* will be sufficient to drive out the fluid.

If curd is not worked even, the larger lumps will not be cooked

enough, or the lesser too much, (like large loaves of bread and small biscuit baked together in one oven,) hence, the cheese is left impregnated with the elements of fermentation, which increase on being exposed to heat, till the cheese is sufficiently swollen (or huffed) for each constituent to occupy a separate space in the same shell, or rind. The fluids first attract together by affinity, forming small cavities in which they remain *unaffected by salt*, become fetid, and generate an unpleasant odor, which is a fair proof of the quality of rennet used. Curd should be salted warm; it is then most absorbent, and thoroughly cooled before putting it to press, to suppress the combined action of *heat and rennet.* The quantity of salt required varies with the condition of the curd, size of cheese, amount of heat to which the cheese is exposed in curing, and market for which it is designed.

A well worked cheese, from fifty to one hundred pounds, requires one pound of refined salt to forty pounds of curd, to remain in the cheese after it is pressed and exposed to a temperature of from seventy to eighty degrees. This may be varied from two to four pounds to the hundred, according to the texture of cheese required—small cheese requiring less, and large cheese more.

A degree of moisture is necessary in cheese for a malleable texture, but this should not be from *animal fluid contained in the curd.* A high salted cheese immediately exposed to high temperature, becomes sour, hard, dry, and crumbling; the same exposed to a cool, damp atmosphere, retains sufficient moisture to be soft, yet solid. A cheese light salted, in a high temperature, will cure quick, become porous, huffy, and stale. *Curd from hay milk* requires much less salt than that from grass or grain feed, as it is poorer, and will retain salt like lean meats. The richer the milk, the more salt is required to control the animal properties, and the *less absorbent the curd;* the pores being filled with the finer buttery particles. (Vide table, April and August.)

More salt is required in hot weather, also, to overrule the *combined action of rennet* and heat, *neither of which will be effective alone.* When curd is ready to press, it is important to *dispossess those decomposing agents.* The gastric juice (or coagulator) is a *fluid,* and works off with the animal fluids in whey; and the only way to get rid of it is to work the curd down *fine and solid,* and *work the whey all out.* Then cool the curd thoroughly before pressing, and the cheese will be solid and keep its place. But if the whey is not all out, the decomposer is yet on hand, continues its action (aided by heat) till *an equilibrium of chemical action is destroyed in the cheese,* and the fluid properties leak out in fetid whey and oil, leaving it a rank and worthless article. In short, the proper method of using salt must be arrived at by a close observation as to its *chemical combination* with the *constituent properties* at different ages of the cheese with different sizes, heat, dampness, &c. This (although an essential point) has not been sufficiently determined by chemical analysis to be reliable.

Pressing.—When curd is properly tempered for pressing, a cotton or linen cloth is spread over the hoop, the curd is put in and

pressed with from three to twelve tons weight, turned twice in eight and forty hours, into clean dry cloth. The press should be faithful, and follow down as the curd yields, (when young,) to press out whey before a rind is formed to prevent its escape. There is no danger of too much pressure *after the first ten minutes*. The press, hoops, cloths, &c., should be cleaned with ley *often*, to keep the rind from cracking. The cloth is taken from the cheese when it is taken from the hoop. The cheese is set on a table for a few hours, till dry enough to absorb oil, and then painted with annatto mixed in strong ley, (from common ashes,) kept in a jar for ready use. This toughens the rind so that it will not require much grease after the first coat, to make a smooth rind, if rubbed often with the hand moistened with oil.

The paint will fade to a rich butter color, which is as high a color as is desirable. A firm rind may be formed upon cheese when young, by a careful exposure to drying air, frequent rubbing with the hand, and no more oil than will readily incorporate with the rind. If more grease is used than will be taken up, it will sooner or later flake off, leaving the cheese scabby without rind, exposed to cracks, flies, mould, &c. Oil for greasing cheese is obtained from cream skimmed from whey after standing 24 hours; it is churned till separation takes place like butter, then melted over a slow fire till it is turned to oil. A preparation of beeswax, from $\frac{1}{8}$ to $\frac{1}{4}$, mixed with oil, will make a rind impervious to flies. It is most desirable that cheese designed for foreign markets should be in a proportion half as thick as they are wide, and not to exceed 100 pounds in weight. The size of the hoop may be calculated from the number of gallons of milk; each gallon will make one pound of cheese.

A cheese	21	inches wide	will weigh	$14\frac{1}{2}$ lbs.	to each in.	in depth.
"	20	"	"	12 lbs.	"	"
"	19	"	"	$10\frac{1}{2}$ lbs.	"	"
"	18	"	"	9 lbs.	"	"
"	17	"	"	8 lbs.	"	"
"	16	"	"	7 lbs.	"	"
"	15	"	"	6 lbs.	"	"
"	14	"	"	5 lbs.	"	"

Cheese of the above proportions are banded with cotton cloth to keep them in shape. The band should not cover more than an inch or inch and a half of the flat surface. Heavy cheese must be banded with cloth that will not stretch, or its gravity will make them ill-shapen.

In April last, I divided curd into two equal parts, after it was salted and ready to press, and pressed in equal and varied shapes to ascertain the result of varied heat, salt, &c. April 24th, (see schedule of April,) No. 1 was kept in a room of from 90 to 100 degrees heat; did not huff, but not having rennet enough to keep pace with the heat, soured, was hard, dry, and smart; shrunk twelve per cent. in sixty days. No. 2, kept in temperature not ex-

ceeding seventy-five degrees, did not huff, cured slow, was soft and of mild flavor, shrunk nine per cent. in ninety days.

April 26th, doubled rennet; put cheese No. 3 by side of cheese No. 1; No. 3 huffed in three days, in twenty days run oil, tainted and spoiled. No. 4 put with No. 2; huffed, cured quick, and was light, porous and sharp. Doubling the amount of salt would control rennet, and keep cheese from huffing; but did not prevent them from souring, becoming hard and unmerchantable. The time of curing was in proportion to the amount of heat and rennet used. Some of the high salted cheese in a hot room were bitter; but none in the cool room had that flavor, were longer curing, shrunk less, and were better cheese. The same course was taken in August, by dividing several days' curd each day into three equal parts, pressed alike, and exposed to different temperatures in curing. The result was in favor of a medium rate of salt and heat, high salting and heat making hard, smart cheese; low salting and heat, soft, mild, and tasteless; low salting and high heat, porous, soft, and sharp.

In 1845, the experiments alluded to, with sixty daries, being got up expressly for shipment, a selection was made from the largest and most experienced dairymen in thirteen towns. A vigorous effort was made to reduce the whole practice to one general rule, consisting in strict cleanliness in every department, an equilibrium of heat in milk to set, not exceeding ninety degrees, with pure rennet to curdle milk in forty minutes; curd thoroughly worked by hand till as fine, when scalded, as wheat or corn; curd scalded in whey with heat not exceeding one hundred degrees, and that heat held until the curd appeared shrunk, and would squeak when pressed between the front teeth. The whey to be drained off, and the curd salted while warm, with $2\frac{1}{2}$ pounds of refined salt to 100 pounds of cheese, cooled and pressed forty-eight hours. Cheese half as high as wide.

These leading points, strictly adhered to, were found adequate to produce the article required, where curing rooms were constructed so as to preserve a uniform moderate temperature. The cheese, not affected by extreme changes of climate, fermented slowly and uniform, rind firm and smooth with little grease; texture firm and solid, yet malleable like butter; the flavor mild and pleasant. The weather being cool till June, a great uniformity was manifest in shape and texture. A sudden change of weather to 88 degrees heat, lasting several days, produced a contrast in different dairies, equal to the extreme in temperature, which was found in many dairy rooms to exceed the common atmosphere from 8 to 10 degrees. With little or no ventilation in these, cheese were much swollen, and could be kept in shape only by using less rennet and more salt. The huffed cheese remaining in same rooms became tainted, or generated a sharp, unpleasant flavor; those removed to a temperature suited to to their constitution, cured quick, and were well adapted to early home markets. Those salted high enough to stand the excess of heat, were hard, dry, crumbly and smart. A dry room was found

best for a wet cheese, and a damp room best for dry cheese; but in no case was a high temperature (exceeding 75°(found necessary.

These and like experiments, too numerous to detail, confirm my conviction that much of the bad flavor complained of in the American cheese, may be prevented with proper attention to curing. In addition to the extreme changes of weather in our climate, which are more than sufficient to destroy the constitution of a well manufactured cheese, the practice too generally prevails, of placing cheese in some loft or upper room, least needed for other uses, and often next to a roof, where heat concentrates, and cheese becomes literally baked as in Nos. 1 and 3. I deem such rooms best as are calculated to preserve an equilibrium of low temperature. A tight, spacious, studded and plastered lower room, well ventilated with northern exposure, where heat may be increased, and air dried by fire and ventilation, or cooled and dampened if required, by air from an underground or adjoining room, where ice may be kept, is best adapted to this climate.

A. L. FISH.

B. P. Johnson, Esq., *Secretary.*

APPENDIX No. 10.

WOOL.

NASHVILLE, TENN., *November* 1, 1848.

DEAR SIR: Your valued favor, requesting agricultural information, was duly received.

After some reflection, I have concluded to confine myself to one subject mainly—that is, to wool growing; though your inquiries embrace many other subjects which have come under my observation.

The annual import of the United States is about eight millions of pounds of raw wool; when, in my opinion, we should export very largely; and if the opinions which I here introduce should aid in effecting a change, I shall be fully compensated.

In your annual report for the year 1847, I find sentiments expressed by Charles L. Fleischmann, esq., from which I dissent. He says that Prussian "Silesia, a province in the north of Germany, has gained the reputation of producing not only the finest wool, but of being the *only market* where thorough blood can be obtained." He again says: "Several attempts have been made in the United States to raise fine wool, but they have never fully succeeded; and to effect a profitable result, we must bring from Germany a thorough blooded flock. It will astonish some of our American Farmers, when they are assured that a single ram is sold at from fifteen hundred to two thousand dollars." I contend that the United States is a better wool growing region than any part of Germany, or any portion of Europe; and that the low latitudes of the United States have advantages over the high. I contend that as fine wool is now grown in the United States as can be produced in Germany; and as thorough bred sheep likewise.

I contend, furthermore, that the low latitudes, from 36 degrees down to 28 degrees, in the United States, can grow as fine wool as any part of Europe or America; and that as fine rams can be bought in the State of Tennessee for $50, as those in Germany which sell for $2,000.

Holding these opinions to be true, I shall attempt to offer some of the evidence which produced them in my mind.

In 1814, I found myself a young Tennessean, and the distant fame of the merino sheep, with his golden fleece, greatly excited my curiosity, and, in search thereof, I commenced a trip to the east. Here commenced my study of sheep and wool growing; and from that period to the present I have given it close attention. I have kept samples of wool, with labels, giving the date, pedigree, &c., for thirty-five years. In 1823 and 1824, I imported from Saxony merinos of the purest blood; and from that date to the present I

have samples of that importation, with all the experiments I have made in crossing for improvements. I have many samples from the most improved American flocks, and many Saxon samples likewise. I have lately received from Mr. Taintor some samples of the best sheep in Europe, with two animals of the selection made for Mr. Scoville, of Connecticut, being from the best flocks in Europe. I have also the card of eighteen samples of wool made by Mr. Fleischmann from the finest sheep of Silesia, and other sections of that country.

If, therefore, a study of thirty-five years—if endless experiments in the time, with diligence, perseverance and devotion to the subject—should qualify me to judge of wool by the samples, and the qualities of the bearer by their presence, I have come to correct conclusions, as above stated; for, by comparison, I find Tennessee growing as fine wool as any of the samples before me, and there are many other flocks in the United States doing the same. This is not a general thing, of course, and I presume the fact was not known to Mr. Fleischmann when he said the attempts in the United States to grow fine wool had failed.

A few flocks in the United States have continued pure—the best importations from Saxony, in 1823–'24, when she had reached a higher reputation in her flocks than Spain, or any other division of Europe. From and after this period, the history of wool culture in Saxony shows that she gave up *quality* for *quantity*. But the thorough bloods that had been sent off to the United States before this, in the hands of a few careful proprietors, who have been true to the subject, still preserve all the beauties of the fleece which had given distinction to Saxony, previous to her change. These flocks now in the United States produce wool as fine in fibre, freer from hairs, and of greater length and softness, than the present German flocks; hence I think it the best broadcloth wool grown on the globe.

The descendants of that importation in the low latitudes of the United States are *superior* to those brought over; which I attribute to climate.

I have said above that the low latitudes have the advantage in wool growing.

An opinion has long prevailed, and will not be changed till experience teaches otherwise, that the warm climate will not produce fine wool. This idea seems to be supported by illustrations drawn from those animals bearing fur. This is fair as an argument, but yields to proofs of a higher grade.

In 1839 I became a cotton grower in the State of Mississippi, in latitude 32½° north, and removed my Saxony flock from Tennessee, in latitude 36°, to my cotton plantation, where I kept them six years. I have the samples grown in that latitude, and consider them the best samples of wool I have ever seen. They possess more of the requisites for a perfect fleece and fitness for superior broadcloth than the produce of the same sheep in latitude 36°—my present residence. I attribute it to this fact, that in Mississippi the food is better adapted to sustain a healthy condition of the skin, which

is kept oily by warmth; green herbage and succulent food during winter as well as summer. The pores of the skin were not closed, the wool did not cease to grow, there was no fever from housing, crowding, and from dry food, but a regular, uniform, and continuous growth of fleece the whole year; which cannot, I think, be produced in any latitude as high as 51°; which is the parallel passing through the north of Germany, where it is necessary to feed six months in the year—from November till May. But *economy* I rank as the chief advantage of the low latitudes, where lands are cheap, very cheap, and green food for winter as well as other seasons. My observations for six years' residence, and to the present time, by annual visits, in latitude 32½°, prove to my mind that the tendency is to improve rather than deteriorate the quality of the wool, even where the finest wools are attempted. A flock in the warm climates requires but little feeding, a very small investment in land, and but little labor in preparing for winter; hence, economy points to a region south of 51° as the true sheep region.

If I have offered any evidence which would be satisfactory to others on the subject, I would suggest that the culture of wool be incorporated with that of cotton, as the *latter* seems to be depressed far below its *intrinsic value*—perhaps by over-production; but be the cause what it may, it is very low, and a suggestion of any plausible substitute would be worthy of experiment.

I suggest wool growing upon the tired lands in the cotton districts; sow down rye, peas, oats, and whatever else may grow well in that region, and pasture the flocks thereon; and in this way renovate and restore the worn and tired lands, instead of a more expensive method of manuring. This would increase the growth of wool and decrease the quantity of cotton.

The United States export two millions eight hundred thousand bales of cotton, and import eight million pounds of wool annually. In addition to the tired lands in the cotton region, there are many millions of acres of land in the south and west unfit for the plough, but yet growing excellent food for sheep.

The tendency of the merino is to ramble and take a great variety of food; hence they are better fitted for the hilly sections of the south than any other species of stock; and these lands which are now a tax upon the proprietors, might, by industry and attention, at some future day be covered with flocks, attended by shepherds, aided by his faithful dog; and thus convert the scattered herbage into the golden fleece, yielding profit to the industrious and wealth to the nation.

The growth of sheep adds to the necessaries of life. No food is more healthful and delicate for the table; no clothing more comfortable for man. There must therefore be a demand for these necessaries, (wool and mutton,) as we are so rapidly increasing in population.

When the councils of Europe and America assemble to deliberate and legislate, they appear clothed in the fleece of the superior merino flocks.

National pride should be stimulated at home, and an American

congressman should feel proud when he can say "I wear a coat as fine as any nobleman of Europe, and the flock which furnished it grew in my own State, and was not imported from a foreign land." To my brother farmers of the west, and cotton growers of the south, I say it requires no importation from Germany or elsewhere; no large investment of capital in a foreign land to commence the wool culture, and to prosecute it profitably anywhere in the United States, from Maine to Texas.

Capital, skill, and industry, are requisite to effect great results in all pursuits; but much, very much, may be effected in wool growing, with a small stock of cash, when combined with other agricultural pursuits. Those of small capital may commence the business with a few hundred, or even one hundred ewes of the common stock, which may be purchased at one dollar each. Then select rams of thorough blood, from those flocks which have preserved pure the best Saxon importation of 1824. They are to be found in the United States, in Ohio, Pennsylvania, Connecticut, and Vermont; and if not certainly found *there*, call on *Tennessee*, and I know they can be found *there*.

It will not require $2,000, $1,500, $600, or even $400, to purchase them as it does in Germany, as Mr. Fleischmann shows, but merely the fraction of $100. Do not hastily conclude that this great difference in price must result from a difference in quality and value.

The foreign price is artificial, and far above the true value, produced by accumulated wealth, pride, and strong competition. Our home price is below the true value for the want of these stimulants.

My directions for a selection of rams, after you have found the flock of satisfactory pedigree, are these:

The fine Saxony ram, combining the proper quality for a breeder, should possess a round, long, well proportioned barrel, giving ample room in the chest, and insuring a constitution of quick, lively action, with a fine, soft, thick, long fleece, by all means uniform in quality, with a fine smooth skin; for without a fine smooth skin, which is the soil on which the crop is to grow, there will not be that uniformity in the fibre, which is so essential to the manufacture of fine cloths; a rough coarse skin will, like a badly prepared soil, yield an uneven crop, some fine and some coarse, varying in felting properties, and will be seen in fine fabrics. The roundness of the body is produced by a well arched rib.

Avoid flat-sided bucks, their offspring will be delicate, sickly, and short-lived; they want space for the lungs and digestive organs, and are liable to disease, for want of resisting capacity in the system.

Having the ewes and the bucks, they are to be kept separate and apart until October, generally, *here* varying the yeaning time according to the latitude, but producing the lambs at the opening of spring, when succulent vegetables may be found by the ewes.

The period of gestation is 148 days, and one buck may be allowed to 50 ewes.

The first season will yield a young flock of half bloods, and the second and third will begin to show the compounding influence of annual births, with improvements in form and value.

I have not space, nor is it designed in this article, to give any system of rules for the management and general treatment of flocks, nor would any general statement of profit be of any service.

The system of treatment would vary and become widely different, as different latitudes are fixed upon for the operations. The management in latitude 32°, should vary much from that in 45°, in the United States; but, as a general remark, I would select dry undulating lands, give daily exercise in all suitable weather, never confine them long on the same grounds or pasture, and furnish moist food and not dry, if to be avoided. They should not be crowded in close houses and forced to breathe a vitiated air.

The merino is a hardy animal, and free from disease, if not produced by improper management. They have constitution and much vitality, and require exercise, and a variety of moist, nutritious food, and a dry *resting place*, not shelters, if the climate be warm, but hill sides, which send off by the rains, impurities and allow a free circulation of air.

Our botanic doctors select from the herbs of the forest their remedies for all the diseases of the human family; so sheep, guided by the instincts of nature, when allowed to ramble in the fields and forests, will, by a judicious selection of astringents and laxatives, maintain good health. Details of disease are not attempted in this; if so, I could report the result of thirty-five years' practice. My remedies, chiefly, with my own flock, are preventives.

Cotton has its appropriate latitude 32½°, and admits of but little variation; but the latitude of wool is from Maine to the mouth of the Rio Grande, from the Atlantic to the Pacific. In any portion of this wide spread domain, wool culture may be made a fair profitable branch of agriculture.

If I should be governed by my own experience in this matter, I should incline to select those sections of the country which would not be expensive in lands; open and mild in winter, to avoid the six months' feeding in Germany, and where the fleece can be kept growing all the year by green, succulent food; thereby preventing a check in growth, which injures the uniformity of the fibre, omitting the expense of long housing and feeding, during the rigors of the long winters.

Can competition be feared from the old world, filled to overflowing with human beings, with lands renting from $6 to $10 per acre, and compelled to feed for half the year? Industry and energy answer, no. And may these sentiments, aided by national pride, and a laudable desire and competition in the warm and cold climates for the golden fleece, bring up this neglected subject to its proper influence in American agriculture.

The labor of a nation is its wealth; and all good citizens are equally interested in its proper divisions and directions. The excesses in different branches should be directed into other channels by the talents of the nation.

Farmers who superintend the fields and flocks are not usually inventive in plans, or skilled in political economy; may I not be excused, therefore, if I invoke the aid of the learned and talented statesmen of the United States (whether in or out of office) in the examination of the subject of wool culture.

Our natural resources appear to be boundless. The bearer of wool may treat with profit those lands fit and those unfit for the plough. My opinion is that sheep may serve as a profitable renovator of tired cotton lands, from Charleston to Matamoras.

From my own experience in Mississippi and Tennessee, I can say that the finest wools for the best broad cloths may be grown in all the cotton regions of the United States; but as the greatest consumption of wool is in the coarser fabrics, the habits of the southern people would point to it as most likely to succeed in the medium qualities. After shearing in the spring, I will furnish at your office samples of wool grown in $32\frac{1}{2}°$ and 36°, showing what has been accomplished in the attempts in the United States to grow fine wool, and furnishing strong proof in favor of the *warm climate.*

In Tennessee, we have no public exhibition of stocks by organized societies at present. I will, therefore, send you samples of wool to test the correctness of the opinions which I have advanced. I should be highly gratified by an opportunity of exhibiting *thorough bloods* against any man in Europe or America—the points of comparison to embrace size and shape of the animal, fineness, weight, and uniformity of fleece. This may seem to be boasting, but it is not so intended; for, as before stated, I have a Saxony flock, based upon an importation in 1823–'4, when the fame of her flocks was deservedly extended far and wide. I have given this importation my strict personal attention for twenty-five years, and have labored to cure defects and render them perfect. I only wish to ascertain if any one has done more—I care not from what country he may come, for I am confident he could have had no advantage in that particular.

The sheep has a domestic foe in the worthless cur, who often commits depredations upon the valuable flocks. Could this nuisance be lessened by a tax on the *extra number* kept at many places, leaving always the *watch* dog, to whose fidelity protection and attachment are ever due? if so, will legislatures generally extend this protection to the herds which I hope to see rapidly increasing throughout the country?

If there should be manifested any general disposition to adopt the wool culture in the great west, I will endeavor to make public, for their benefit, in some agricultural journal, the results of my experience on two other points, which might be useful to many whose attention has never been directed to the subject, namely:

1st. General directions for the management of a flock in the south and west, embracing feeding, crossing, shearing, and putting up wool for market, washed or unwashed, &c., &c.

2d. A system of remedies for the diseases which are most com-

mon among sheep; assigning the causes of the disease, when known, that they may be avoided by care and attention.

Many deaths will likely occur when there is a very limited knowledge of disease; but a little attention for a few years will remedy this objection.

I should, therefore, recommend beginners to commence with low priced ewes and a fine buck. The investment would be small, and the improved value of the offspring, from the merino crop, would prevent any loss, in the hands of the most uninformed, unless by gross negligence they should be suffered to perish.

In the lower districts of the United States, which are too warm for corn, and therefore unprofitable for the raising of pork, sheep may be grown as a partial substitute for pickled pork. The mutton, skin and wool, will compensate well for the investment and necessary attention.

I feel a deep and abiding interest in the prosperity and success of the cotton districts, and am confident that wool growing will aid to sustain them in times of difficulty and depression, like the present, when the great staple, cotton, is forced below its intrinsic value, by causes abroad over which they have no control.

To avoid the influence of foreign wars, commercial disasters and bankruptcies in Europe, let the spindles and looms be brought to the corn fields of our rich valleys, near the cotton fields; draw off a portion of the labor from the tired lands of the cotton districts, and transfer it to the cotton mills; resuscitate the worn lands by peas, rye and oats, for the flocks.

A portion of all large cotton plantations may reduce the number of acres in cotton without affecting the yield, by adopting this rotation, and taking wool and mutton as the produce of the resuscitating portion of lands.

If such a system of management shall be generally adopted in the south, the sun of prosperity would again shine brightly.

I am not advancing the opinion that the south is a stock country generally, but I am satisfied it is adapted to sheep; they do not require the rich grass pastures and grain which are so necessary for other stock.

The south seems to be designed by climate, and other natural permanent causes, as the great producer of the raw material for clothing.

Another law of nature demands a rotation of crops to insure success in agricultural pursuits; but the south is not and *cannot* be a farming country, adopting the rotations usual in higher latitudes—yet it may adopt *wool growing* as a rotation, and still pursue the productions indicated by natural laws.

Variety in the productions of all countries is better, as a system, than any one staple; but the substitutes must be suited to the climate and soil. Hence, I say grow both cotton and wool; they will both prosper in the south.

In cotton, we have, inferior, fair Louisiana, and Sea island, yielding different prices, from 5 to 30 cents per lb. In wool, we

have common, mixed bloods, and superior Saxony, worth from 15 to 100 cents per lb.

The superior cotton, Sea island, is confined to a few islands on the coast of Georgia; but the superior Saxony wool may be grown in any State in the Union.

We are told that thorough bred rams, in Silesia, are now worth from $500 to $2,000 each. If any combination of circumstances in Germany could produce such a result, it certainly furnishes much encouragement to growers of the same stock in the United States, where lands are cheap, and the cost but little for wintering. At one-tenth of those prices in the United States, the business of growing merinos for sale would yield very large profits.

Your report is a valuable public document, and I hope to see your office sustained and encouraged by Congress, and your inquiries extensively answered.

Your labors promise much good to agriculture, commerce, and manufactures, and to the prosperty of the country at large.

I thank you for the distribution of the samples of wool brought over from Europe by Mr. Fleischmann. They furnish valuable information to the owners of thorough bred flocks in the United States; for, by comparison, they can see what progress they have made in growing fine wool.

You will by no means consider me as detracting from the labors of Mr. Fleischmann. I disclaim any such design. His report, as published by you, contains a great deal of valuable information on the subject of wool and sheep; but, believing some of his opinions were calculated to produce erroneous impressions among those who are not informed on the subjects, I have endeavored to furnish some facts which have caused me to differ from some of the views expressed in his report, with no other object than a desire to have the whole facts presented to those who may read it.

I have lately seen a statement of a "letting for one year only," of 65 rams in England, of the mutton stock, which averaged $135, some bringing $300. This was for the services for one season, when they are all returned to their owner.

What peculiar value do these rams in England and Germany possess, which may not be given to them here? None. These facts show promising signs for the future, to those who may steadily prosecute the subject of sheep growing in the United States.

The importations of raw wool, and the importations of immense quantities of manufactured woolen goods annually into the United States, shows that an extensive home market may be found for wool, which I hope to see soon supplied from our own farms, plantations, and mountains. Prosperity to the spinners of wool and cotton at home and abroad; but especially to the former! Away with all all antipathies between the spinners and growers of these great clothing staples of our country! They should be identified in sympathy and mutual support, and, by concert, add to the profits and prosperity of both. Individual *man* is weak and impotent; but associated *man* is powerful. So with interests of a kindred kind; acting separate and apart, and with jealousy towards each other,

all may languish and decline; but, by association and mutual support, they may flourish and produce wonderful results.

Our great interests should be leagued together, as the States of the Union, if we hope for general prosperity. They are dependent one upon another, and the destruction or depression of any great interest is felt, by its recoil, on others throughout the land.

Sheep husbandry in the south and west is in its infancy; but a wide field is open for its development. It is a permanent, substantial branch of agriculture; because wool and mutton are among the necessaries of life, and there must be an increasing demand with an increase of population.

The price of sheep in Germany and England shows this to be so. It is a stock which multiplies with rapidity.

A flock of an hundred ewes should in eight years produce at least a flock of a thousand. It may be commenced with a small capital, and with but little preparation; or it may well engage capital, talent, learning, industry, and energy.

I remain yours, very respectfully,

MARK R. COCKRILL.

To the Hon. Edmund Burke,
Com. of Patents, Washington City.

APPENDIX No. 11.

HOG CROP.

We are indebted to Charles Cist, esq., editor of the Cincinnati Daily Advertiser, for the following statement of the hog crop of the west, which he has forwarded to us in a slip prepared for his journal. We have added to this appendix also the account of the farm stock of Ohio reported to the assessors for the State of Ohio, land operations, &c.

The pork market.

Our friends in the Atlantic cities are reluctant to credit the falling off in the pork crop, asserted to exist by the statements made here and at other pork packing points in the west. They ask how can we reconcile the assertion that a smaller number of hogs has been put up recently than a year ago, in the face of the known fact, that up to the 24th ultimo 383,364 barrels had been received in New Orleans from the pork regions of the west, while 355,000 barrels formed the entire receipts last season at that port?

This is a fair question, and shall be fairly met. The facts necessary to place this subject in the proper light, arrange themselves under several heads, as follows:

1. The eastern market had been rendered bare in August last to an extraordinary degree, and extensive supplies being required at this juncture for California, high prices became a necessary consequence. I shall not stop to prove this state of case, there being no dispute as to its existence.

2. As a result of the continuance of this pressure on the market, pork packing in the west commenced earlier than usual, and a larger share of barrelled pork was put up, and less of the article laid aside in bulk meat and bacon for later sales, than was ever known before. As evidence of this, the New Orleans tables of the date referred to, in the query to which I now reply, state—

	Pounds bulk meat.	Barrels of pork.
1847–'48	5,026,900	193,146
1848–'49	2,989,180	383,564

This table on its very face reverses for the late season the proportions of these articles as they existed the previous one. But facts to which I shall presently allude place the disparity in a still stronger light, by showing on the one hand that 17,336 barrels of pork should be taken off the list and added to the first line, and that still greater deductions should be made, on account of hams pickled in barrels, and shoulders, sides, and hams, in hhds., shipped in December and January last, which, reduced to barrels,

enter into the great aggregate of mess and prime pork in the New Orleans table.

3. Concurrent with the unexampled scarcity and high prices at the east, and with the early packing thus engendered, the western streams, usually low or frozen up in December, January, or February, were not only unobstructed by ice, but unprecedentedly full throughout that whole period. The Illinois and Wabash had overflowed their banks, and the Ohio maintained during the pork season a stage of water fully as high as was desirable. The season of the year being that at which steamboats are usually idle, freights were also at uncommonly low rates.

4. As a result of these things, the banks put draft time on the Atlantic cities at sixty days, in place of three and four months, as heretofore, furnishing thus added motives to forward pork products earlier to market, as a means of meeting their short date engagements. Independently of the motives already alluded to for putting up and forwarding barrelled pork, lard was at prices at the east too low to justify shipment, and the banks refused to take drafts on New Orleans, where the bulk meat might have found a market.

5. The business year of New Orleans begins and ends September 1st. The increasing scarcity in August, 1848, drained the entire stock of barrelled pork from Cincinnati and other pork packing points west, where it had been held for a rise. All this reached New Orleans, of course, later than the 1st. of September, and accordingly forms a share of the pork published in this table as the packing of the recent season. This taken from one period and added to the other would reduce the difference 34,672 barrels. I say nothing of the deduction of hams in barrels, and hams and shoulders in sides or hogsheads put up in pickle, which are reduced to barrels as mess and prime pork, simply because I have no means of ascertaining the quantity. It is undoubtedly large.

6. The extremely high water for weeks past on the Mississippi river has, to a great extent, prevented deliveries of bulk meat and pork on the plantations, and compelled its deposite at New Orleans until that stream subsides. All this is included in their tables, and tends to deceive dealers abroad as to the stock in market. The supplies for the coast, as it is called, it is well known form an important share in our shipments.

All these facts are susceptible of proof, and they prove incontrovertibly that the large amount of barrelled pork received at New Orleans at the latest dates, affords no just reason for supposing that the pork crop of the recent p cking is, as our eastern brethren infer, an increase upon the previous one. I am abundantly satisfied that it is a fall off in both quantity and weight of hogs, in both respects a deficiency of from 20 to 25 per cent.

I have no pecuniary interest in the subject, as is well known, but am under the strongest possible motives, as a dealer in statistics, to spare no pains to ascertain the truth, and to state it correctly. I confidently predict a heavy rise from present prices before the season is through, and am willing to risk my reputation for judgment on that result.

Pork packing in the west.

MISSOURI.

		1847–'48.	1848–'49.
Lexington		6,000	6,700
Camden	5,000		
Brunswick	5,000		
Glasgow	3,000		
Boonesville	5,000		
Rockport	3,000		
Liberty	2,000		
St. Joseph's	5,000		
Weston	12,000		
		40,000	46,300
St. Louis		65,924	89,400
Hannibal		22,000	17,000
Louisiana		5,500	3,500
Marion City		7,000	
		146,424	162,900

ILLINOIS.

Alton	37,000	27,000
Rockport	3,500	2,200
Lagrange and Tally	6,000	6,000
Churchville	5,800	2,000
Warsaw	11,000	9,500
Quincy	21,650	18,400
Oquawka	10,000	9,000
Peru	3,800	3,500
Lacon	5,600	7,000
Peoria	26,000	19,500
Pekin	25,800	16,000
Point Isabel	5,500	3,500
Beardstown	27,000	45,150
Meredosia	11,400	2,600
Naples	6,000	3,000
Lagrange	3,000	1,500
Canton	10,500	10,000
Knoxville	12,000	11,000
Springfield	3,400	2,350
Griggsville	7,000	4,500
Tremont	2,000	1,500
Lawrenceville		4,000
Darwin	4,000	
Chicago	26,682	
Florence		2,500
Hennepin		2,000

	1847-'48.	1848-'49.
Ottaway		2,000
Chillicothe		2,000
Farmington		4,000
Henderson		650
Bath		800
Galesburg		2,000
	274,632	225,150

IOWA.

Keokuk	10,500	18,000
Bloomington	10,000	9,000
Fort Madison	10,000	8,500
Burlington	17,000	15,000
	47,500	50,500

INDIANA.

Indianopolis	1,500	12,000
Southbend	2,000	
Delphi	10,000	
Lafayette	27,000	45,000
Attica	10,000	9,000
Covington	7,000	5,500
Perrysville	7,400	7,000
Clinton	15,000	16,000
Montezuma	4,000	
Eugene	7,000	
Terre Haute	47,500	47,000
Newport		5,000
Minor points	5,000	
Williamsport		10,000
White river points	29,000	
Brookville and Metamora	1,600	5,000
Laurel	2,000	12,000
Connersville	3,000	13,000
Cambridge City, Milton and Hagerstown	4,400	13,000
Madison	98,000	85,168
Jeffersonville		30,000
Aurora	10,000	
New Albany		10,000
	289,400	324,668

OHIO.

	1847–'48	1848–'49.
Columbus	25,000	19,200
Zanesville	5,000	
Chillicothe	55,000	64,756
Circleville	19,500	14,000
Lockburn	7,000	2,000
Groveport	8,000	3,500
Waverly	5,500	2,500
Lancaster	2,500	1,600
Preble county	27,228	20,160
Warren county	30,100	
Lebanon		8,000
Waynesville and Corwin		12,000
Bellbrook		3,000
Clinton	17,300	
Wilmington		4,000
Clarksville		2,000
Port William		13,000
Centreville		10,000
Dayton	8,000	8,000
Springfield		2,000
Brown county	17,824	
Cincinnati and Covington	498,160	410,000
All other points	15,100	
	741,212	599,716

KENTUCKY.

Louisville	97,200	115,000
Maysville	10,000	20,000
	107,200	135,000

Recapitulation.

Missouri	146,124	162,900
Illinois	274,550	225,150
Iowa	47,500	50,500
Indiana	289,400	324,668
Ohio	742,152	599,716
Kentucky	107,200	135,000
Tennessee	100,000	60,000
	1,706,926	1,557,934

FARM STOCK IN THE STATE OF OHIO.

A table showing the number of horses, mules, cattle, sheep, and hogs, in each county of the State, according to the returns of the assessors of 1848.

Counties.	Horses.	Mules.	Cattle.	Sheep.	Hogs.
Adams	5,911	7	7,812	22,065	25,085
Allen	2,886	....	5,672	10,331	10,481
Ashland	6,708	1	12,410	58,852	21,950
Ashtabula	4,915	62	30,714	63,238	7,660
Athens	4,570	4	10,231	43,513	15,546
Auglaize	2,712	....	5,842	8,046	11,719
Belmont	9,341	10	12,454	70,029	26,804
Brown	8,053	11	9,876	24,741	39,851
Butler	10,507	12	11,838	17,358	64,067
Carroll	5,721	23	9,033	75,729	16,924
Champagne	7,217	136	11,842	42,516	21,844
Clark	6,717	74	14,122	53,513	24,937
Clermont	8,472	45	10,535	24,605	44,731
Clinton	6,855	130	10,600	43,665	38,955
Columbiana	8,542	11	13,606	114,056	22,111
Coshocton	7,112	9	12,279	55,524	25,306
Crawford	4,797	....	10,982	47,688	21,735
Cuyahoga	5,802	3	16,367	80,346	13,029
Drake	6,333	5	10,241	23,875	29,669
Defiance	1,037	1	3,183	2,111	5,993
Delaware	6,563	9	11,144	44,635	30,118
Erie	3,398	....	8,579	54,390	8,912
Fairfield	9,948	17	15,862	44,354	40,054
Fayette	5,800	173	15,444	38,614	35,314
Franklin	9,256	174	14,501	31,357	51,983
Gallia	4,250	1	7,777	20,604	13,648
Geauga	3,783	10	18,516	77,252	6,780
Greene	7,955	71	12,547	46,643	35,401
Guernsey	9,268	8	13,175	77,130	27,186
Hamilton	12,098	25	12,116	20,815	34,607
Hancock	4,255	1	8,486	21,013	18,951
Hardin	4,172	1	14,023	7,350	11,038
Harrison	5,992	9	8,394	121,219	18,585
Henry	443	4	1,548	713	2,234
Highland	8,813	14	11,022	38,848	46,509
Hocking	3,276	....	6,524	17,057	12,304
Holmes	6,020	14	10,511	43 481	19,878
Huron	5,986	17	15,036	65,330	17,678
Jackson	3,704	21	8,449	21,431	13,834
Jefferson	6,359	3	8,513	101,968	19,130
Knox	8,030	5	12,411	75,820	26,037
Lake	2,914	14	9,959	47,028	5,702
Lawrence	2,713	87	5,315	7,835	9,873
Licking	11,467	22	18,891	105,862	35,438
Logan	5,788	11	9,196	32,816	22,004
Loraine	5,139	24	17,253	90,653	14,391
Lucas	2,714	....	9,560	13,914	9,902
Madison	4,732	192	32,592	41,904	25,007
Mahoning	6,442	26	14,932	107,252	14,048
Marion	4,799	23	11,784	38,741	24,319
Medina	5,269	....	15,262	82,521	14,419
Miegs	3,027	12	7,022	21,978	9,366
Mercer	1,942	....	4,102	5,059	10,577
Miami	7,350	2	10,437	29,060	27,020
Monroe	5,506	12	9,372	27,525	20,495

FARM STOCK IN THE STATE OF OHIO—Continued.

Counties.	Horses.	Mules.	Cattle.	Sheep.	Hogs.
Montgomery	10,177	30	13,862	25,721	40,099
Morgan	7,063	3	11,379	50,271	21,324
Morrow	5,924	7	10,866	48,843	21,162
Muskingum	11,462	28	17,913	74,882	35,825
Ottawa	773	....	2,625	6,632	3,742
Paulding	292	....	841	416	1,931
Perry	6,629	9	10,653	45,779	21,579
Pickaway	8,233	3	21,416	31,523	54,589
Pike	3,343	9	5,214	11,628	16,211
Portage	5,552	58	23,060	114,774	11,344
Preble	8,132	3	11,055	28,678	42,532
Putnam	1,659	1	3,809	5,731	7,694
Richland	7,888	12	13,945	58,007	27,142
Ross	10,148	35	22,705	30,075	62,229
Sandusky	3,314	3	8,213	25,067	13,513
Scioto	3,764	78	6,657	11,431	13,150
Seneca	6,844	2	14,214	53,263	24,563
Shelby	4,007	12	6,893	15,431	16,223
Stark	9,647	16	18,607	92,327	32,340
Summit	5,146	7	14,899	82,295	16,231
Trumbull	6,728	47	31,088	101,864	13,983
Tuscarawas	7,717	17	13,749	61,100	33,758
Union	2,862	137	8,004	19,618	20,853
Van Wert	849	1	2,405	2,041	5,141
Warren	8,572	10	11,533	29,388	40,912
Washington	4,873	....	10,289	42,298	16,401
Wayne	9,988	7	17,894	75,390	28,149
Williams	996	....	4,509	3,980	6,109
Wood	1,978	1	6,520	8,466	8,442
Wyandot	3,060	7	6,590	27,684	11,295
Totals	492,509	2,098	983,822	3,677,171	1,879,589

NOTE.—The foregoing table does not include horses and cattle under two years old, mules under one and a half years old, and sheep and hogs under six months old, on the first day of June last.

Total value of horses, $16,856,841. Total value of mules, $78,955. Total value of cattle, $9,729,929. Total value of sheep, $1,988,316. Total value of hogs, $2,341,106.

Steam rendering lard operations of Cincinnati.—By C. Cist, Esq.

The history and statistics of the product of the hog in Cincinnati would be imperfect without a glance at the extensive operations of E. Wilson & Co., of our city, in one branch of their operations alone—their lard rendering operations.

Rendering lard by steam is no novelty, either here or at other points in the United States, being, like most other manufacturing operations, carried on by that powerful agency, a means more cheap and efficient in accomplishing results. But the difficulty is that the *gelatine* cannot, under the ordinary processes, be separated from the lard, the flavor and purity of which is greatly injured, during the warm season, by its presence and contact. This firm

gets rid of this difficulty by a very simple but ingenious process, the invention of their principal, Mr. E. Wilson.

Four iron tanks are constructed of boiler iron to receive the pork, which embraces the entire animal, the hams excepted, which are too valuable to be rendered into lard. These tanks are circular in form, 6 feet in diameter and 12 feet in height, and weigh each from 5,000 to 5,500 pounds, being made of the thickest kind of rolled boiler iron. The hogs are cut up as nearly as possible into four pound pieces, which are thrown into the tanks, when they are subjected to a pressure of steam of seventy pounds to the square inch, or a temperature of 308° Fahrenheit, which, in the course of ten hours, reduces the bones to a substance like slacked lime, and, consuming the gelatine, which becomes specifically heavier in these operations, precipitates it into the lees. The rendered lard runs off from the tanks into coolers in the ordinary way; whence it is drawn into barrels, or kegs, as the case may require.

These four tanks will daily render from fifty thousand to sixty thousand pounds of the gross material, according to the precise article. They require the attendance and labor of twelve men.

The lard produced in this mode is of a quality as pure in taste and keeping as that which is rendered in kettles.

E. Wilson & Co. have made this season lard of the various qualities to the amount of 1,500,000 pounds, which would be equal to thirty-five thousand kegs of the ordinary size, and worth, at the usual prices, over one hundred thousand dollars.

Of this quantity three-fourths is strictly prime lard; the other one-fourth being made of inferior stock.

It must be borne constantly in mind that the finer quality of this lard, as compared with a steam rendered article, in the ordinary mode, results from the intense heat which consumes or decomposes every element in the carcase but the lard, affording, in that operation, a thorough separation of the lard from every thing else.

But the efficiency of this process is still less extraordinary than its cheapness. The whole expense of rendering in this mode does not exceed 33⅓ per cent. of the ordinary process. Where the inferior raw materials are employed the disparity is vastly greater.

This mode of rendering lard is equally applicable to the rough fat of sheep or cattle, to which purpose these tanks are applied in other establishments.

There are twenty tanks in employment here, and nearly as many more in operation throughout Kentucky, Indiana, Illinois, and Missouri. Two or three years will suffice to introduce them through the entire hog producing regions of the west.

The whiskey and alcohol of Cincinnati.—By C. Cist, Esq.

Cincinnati is not only the greatest market in the world for hogs, but for whiskey also. And for the same cause—that of being the great business centre of the largest district in which corn is raised, with facilities to convert it into some convenient shape for export, ither by feeding it into hogs or cattle, grinding it into meal, or

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distilling it into whiskey. The State of Tennessee, with its adjacent country, doubtless raises more grain as an export in the form in which it grows, but manufactures a very small share of the crop, by converting it, as in the Ohio valley country, into other products.

When I refer to Cincinnati as the great whiskey mart of the west, or of the world, I speak of points in which the article finds its first sale, although it may prove also the fact that whiskey will be found at all times in larger quantities here than in any other market. It is certain that the rise or fall of whiskey here affects every market in existence.

Cincinnati receives for sale the whiskey made throughout the greater part of the States of Ohio, Kentucky, and Indiana, with a share of that of western Pennsylvania, and the river Ohio, the Miami and Whitewater canals, and the Little Miami railroad, affording cheap and convenient transportation to this market. It is also wagoned to the city from neighboring distilleries; as well as manufactured in Cincinnati and its suburbs, probably to the extent of one seventh of the whole.

One thousand barrels, of forty gallons each, as an average, are the daily supply of Cincinnati. One house alone receives one-third that quantity as its proportion of the business.

The share of whiskey consumed annually in Cincinnati, for every purpose, would not exceed its market supply for one week, and even of this limited quantity, the largest proportion is employed in medical preparations and the arts. That portion of the community which elsewhere drinks whiskey, drinks beer and ale in Cincinnati.

The whiskey brought here is rectified, and exported in steam and flat boats to New Orleans. The coast, as it is called, of the lower Mississippi, is a heavy purchaser of the article. From this general aggregate must be deducted about one-eighth of the whole quantity, which is converted into alcohol or pure spirits, and applied to various purposes in medicine, manufactures and the arts, its principal market being our Atlantic cities. In this process the whiskey is reduced in quantity thirty-nine per cent.—one hundred barrels of whiskey making only sixty-one barrels of pure spirit or alcohol.

The quantity and value of the whiskey and alcohol disposed of here or shipped off may be stated thus—

276,000 barrels of whiskey, averaging 40 gallons to the barrel, at $8	$2,208,000
36,000 barrels reduced to alcohol is 21,960 barrels, at $15	329,000
	$2,537,400

In estimating the average value of whiskey as above, at eight dollars per barrel, it must be recollected that as it has usually brought here ten per cent. above proof, the same per cent. must be added to the current price of the article.

At the usual product, the quantity of corn requisite to supply

this extent of whiskey would amount to 4,056,000 bushels, which would not be three per cent. of the entire crop of the region which supplies the whiskey.

The genius of the age displayed in labor saving machinery is illustrated in the laboratories in which the alcohol is made here. One of these, that of Lowell Fletcher, occupies but *twenty feet square of space*. Yet such is its simplicity, efficiency, and adaptation to its purposes, that within that bounds a capacity exists to manufacture, with two stills of eight hundred gallons, half a million of alcohol annually. So that this establishment alone can consume more than eight hundred thousand gallons of whiskey in its business operations.

APPENDIX No. 12.

TABLES OF VARIOUS KINDS.

The table of averages of seeding and product in the different States, with the time of planting and harvesting, and prices of the various articles, is compiled from a number of returns in the different States; and in some instances, perhaps, eight or ten—in others, not more than four to six; and in one or two instances, perhaps, not more than two. The extremes are given, and the replies ranged from these; but in many instances there was almost an entire similarity in the judgments formed in the case of the most prominent crops. In respect to some of the crops, also, regard must be paid to the different varieties cultivated. In the potato crop, both the common and sweet potato are embraced in the replies from certain States; and this fact deserves recollection when the disparity of seeding is mentioned. For a few of the States, as no returns were received

TABLE OF AVERAGES.

WHEAT.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. per acre raised.
Maine.........	May 15 to June.....	$1\frac{1}{2}$ bush..	August 20 to 30.....	7 to 12
N. Hampshire..	April to May 20....	$1\frac{1}{2}$ to 2 bush....	August 1 to 20......	12 to 25
Massachusetts.	April 10 to 25	$1\frac{1}{4}$ to 2 bush....	June 25 to Aug. 10..	....
Vermont.......	May 1 to September.	2 to $2\frac{1}{2}$ bush....	Last Aug. to Sept. 1	10 to 40
New York	May 10 to Sept. 1..	$1\frac{1}{4}$ to 2 bush....	July 2 to Aug. 10...	8 to 20
New Jersey ...	Sept. 1 to Oct. 15...	$1\frac{1}{3}$ to 2 bush....	June 28 to July 7...	16 to 30
Pennsylvania..	....do......do......	$1\frac{1}{4}$ to 2 bush....	June 15 to July 15..	10 to 25
Delaware	....	1 1-6 to 2 bush..	....	14
Maryland	October............	$1\frac{1}{2}$ bush....	June	6
Virginia.......	Sept. 15 to Nov. 30..	1 to 2 bush.....	June 15 to July 15..	8 to 20

in answer to our circular, there are no records made. It would have been gratifying to have presented a complete view; but it was not possible in these cases of failure. The other tables, relating to estimates of the proportion of cultivated land to uncultivated, of corn stalk and straw fodder to the grain, the rotation of crops, and the cost of raising different crops, with amount of consumption, and the prices of various agricultural products and wages of labor, can of course be viewed only as the results of the conclusion of a few in each section of the country. Yet many of those who have furnished this information are among the prominent successful agriculturists, in their respective districts; or practical farmers, who show that, though the subject is new to them, they duly appreciate its importance, and have gladly lent their aid to promote the object. The replies, generally, relate to a county or district, though in a few instances, perhaps, they have been confined to a single town. The number of the returns was not sufficient to allow a condensation in a tabular statement, in respect to some of these subjects; and they have, therefore, simply been drawn out and entered in the order of the States as used in the tabular estimate of crops. Though defective in many respects, yet at the same time they are of some value, and may lead to better ones hereafter.

TABLE OF AVERAGES.

WHEAT.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
Black and Red sea, bald; red beard; spring red seed.	Sward and corn stubble; high ridges; dry pasture.	All; all	$1 25 to 1 50
Black sea; native	Clay loam; new upland; diluvial; black loam.	All; all	1 25 to 1 50
....	....	....	1 50
Bearded; Black sea	Loam or clay; clay loam; clay and loam.	All	1 00 to 1 75
Soule's Canada black; Mediterranean red beard; white flint, do.	Sandy loam; clay loam and loam clay; loam mixed with gravel.	4; all; 10; 90..	1 00 to 1 25
White bald and Med. red; Med. blue stem; white flint.	Friable loam; loam; clay loam; sandy loam, rather stiff.	½; 2; all; ⅔ ...	1 10 to 1 25
Mountain Med.; do. do. red beard; Med. red bearded; white, blue stem.	Light sandy; clay soil; sandy loam; limestone; do.; clay, mixed with gravel; clay; do.; clay and gravel.	30; 20; 60; all; 40.	75 to 1 25
Blue stem; white Zimmerman; Med. bearded; red chaff; white smooth; red bearded do.; Med. red chaff.	Rich loam; clay	10............	1 00
Early red and purple stem; purple stem; Georgia Med.; blue stem.	Clay; do. do.; clay and lime.	¾; 45; 50......	62½ to 1 00

TABLE—Continued.

WHEAT—Continued.

States.	Time o sowin or planting.	Average bushels or pounds of seed er acre.	Time of harvest.	Av. bush. per acre raised.
South Carolina	Oct. and November..	50 lbs	June 1.............	8
Georgia	Sept. 15 to Nov.....	¾ to 1 bush.....	June 1..............	8 to 10
Alabama......	Sept. to December..	½ to 2 bush.....	June to July........	8 to 15
Tennessee	October 12..........	1 to 1½ bush....	June 15	6 to 10
Kentucky	Sept. and October...	75 lbs..........	July	13 to 15
Ohio	Sept. 1 to Oct. 25...	1 to 1½ bush....	June 28 to July 20..	10 to 20
Indiana	Sept. to October....	1 to 2 bush.....	June 15 to July 20..	12 to 30
Illinois	August to Sept. 30..	1 to 1½ bush....	May to July 1	10 to [illegible]5
Michigan......	Sept. [illegible] to Oct. 1....	1¼ to 1½ bush...	June to July 30.....	15 to 25
Iowa	Aug. [illegible] to Sept. 15.	90 lbs. to 1½ bu.	July 5 to 20.........	12 to 30
Texas	Oct. 1 to Dec. 15 ...	¾ bush.	May 1 to June 10...	30

BARLEY.

Maine	Last of May........	2 bushels........	....	15
N. Hampshire.	April; May.........	2½ to 4 bush	August	20 to 40
Massachusetts.	May................	2½ to 3 bush	July 30.............	35 to 40
Vermont	July 1..............	2 bushels........	August 1	....
New York	April 10 to May 10..	2 to 3 bush.....	July 1 to August....	15 to 40
Pennsylvania ..	March 15...........	1½ to 2 bush	June and July.......	20 to 45
South Carolina.	September	2 bushels........	May	20
Tennessee	March 1............	1 bushel	July 1..............	....
Ohio	April 1 to May 1....	1½ to 2 bush.....	July 1 to 25.........	15 to 25
Indiana........	April to September..	1¼ to 2½ bush. ..	June 25 to August...	25 to 40
Michigan	April 15 to May 1...	½ to 2 bush.	July 7 to August 1 ..	25 to 30
Iowa	March to April 1....	1¼ bushel........	July 1..............	15 to 30

OATS.

Maine	April to May	2½ to 3 bush.....	August 10 to 30.....	25 to 35
N. Hampshire .	April and May.......	3 to 4 bush......	August 1	25 to 30
Massachusetts.	April 10 to May 10..	2½ to 3 bush.....	July 15 to August 20.	20 to 60
Vermont......	April to May 15.....	3 bushels.......	August	25 to 40

TABLE—Continued.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
WHEAT—Continued.			
Red	Clay	2 bushels per head.	$1 00
Early do.; do. spring	Red malatto	50; 70	$0 60 to 75
Little white	Loam; oak and hickory	More than raised.	50 to 1 00
Smooth head Walker, May, and Reed.	Dark loam; all kinds	75; all	50 to 95
Red bearded	Clay	Not enough raised to supply demand.	75
Red chaff; smooth; blue stem; garden Med.; do. red straw and red bearded; white and red chaff.	Oak and maple land; clay; do.; very warm; limestone; clay loam; yellow clay; clay; sandy.	20; $\frac{1}{3}$; 1-5; 33$\frac{1}{3}$; 40; 66.	60 to 1 00
White chaff; blue stem; smooth head and red chaff; red chaff; bearded; white; golden chaff.	Sand and loam; clay loam; clay; improved clay; loam do.; clay; sandy loam.	20; $\frac{1}{8}$; $\frac{1}{3}$; 75; 50; $\frac{1}{8}$; 50.	45 to 75
Golden chaff and May; do. and white flint; do. and spring; red chaff; bearded and blue stem; red chaff; bearded.	Sandy loam; clay; oat or clover stubble; clover; rich loam.	50; 1-7; 25; 20; 75.	62$\frac{1}{2}$ to 80
Hutchinson's; Med. blue stem; white flint Soule; flint.	Marl clay; clay and sand; oak; clay loam.	All; 30; 25; 50	62$\frac{1}{2}$ to 1 00
Red chaff; velvet; red chaff, bearded.	....	....	50 to 75
Mexican red chaff; golden chaff; fall.	Lime soil	....	75 to 1 00
BARLEY.			
Two rowed	....	75	$0 75
Two rowed; bearded	Black loam	....	$0 75 to 1 00
....	High, warm land	All	67
....	Dry	All	49
Hutchinson's two rowed; six rowed; two & four rowed.	Loam; warm loam; loam and muck; sandy loam; black sandy loam.	50; 75; 100; all	50 to 75
Fall; winter	Heavy clay; sandy loam	50; 75	62$\frac{1}{2}$ to 75
....	Clay	All	50
....	....	....	50
Spring; do	Clay, mixed with sand; clay loam; loose do.	Nearly all; 10; all; all.	25 to 50
Large white; common spring.	Clay; do. loam; dry, sandy loam.	All; all	33$\frac{1}{3}$ to 55
Six rowed	Sandy loam; rich loam	25; all	35 to 44
....	....	80	25 to 50
OATS.			
Common	Dry; gravelly	50 to 60	$0 30 to 35
Winter; common; white	Clay; sandy; free	$\frac{1}{2}$; $\frac{3}{4}$	40 to 87$\frac{1}{2}$
....	High, warm land	All	37$\frac{1}{2}$ to 1 00
....	Light; sandy	$\frac{3}{4}$	20 to 42

TABLE—Continued.

OATS—Continued.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. per acre raised.
New York.....	March 15 to May 25.	$1\frac{1}{2}$ to 3 bush.....	July 10 to August 15	25 to 100
New Jersey ...	April 1 to 15........	2 to $2\frac{1}{2}$ bush.....	July 20 to August 1.	15 to 35
Pennsylvania ..	March 15 to April 15	1 to 3 bush......	July 10 to August 1.	25 to 75
Delaware	....	....	....	$26\frac{1}{2}$
Maryland	April...............	2 bushels........	July	10
Virginia.......	February to April 1 .	$1\frac{1}{2}$ to $2\frac{1}{2}$ bush...	July 10 to August 10.	10 to 35
South Carolina.	Dec. to February....	1 bushel........	June 1 to last June..	10 to 12
Georgia	January to March 1 .	1 to $1\frac{1}{2}$ bush	June to July 1	12 to 60
Alabama......	November to April..	$\frac{3}{4}$ to 1 bush......	May and June......	10 to 30
Mississippi.....	October to February.	1 bushel........	July	20
Tennessee	Feb. 15 to March . .	$1\frac{1}{2}$ bushels......	July 10..............	10 to 20
Kentucky	March and April....	48 pounds.......	July	30
Ohio..........	March and April....	2 bushels.......	June to August 1 ...	20 to 45
Indiana..	March to May 1	$1\frac{1}{4}$ to 2 bush.....	July 1 to August....	25 to 45
Illinois........	March 20 to April 4.	$1\frac{1}{2}$ to 2 bush.....	June to August 1....	20 to 45
Michigan......	April 10 to 30.......	2 to 3 bush	July 7 to August 1..	25 to 60
Iowa	April...............	2 to 4 bush......	July 15 to August...	30 to 50
Texas	February	1 bushel........	May................	....

RYE.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. per acre raised.
Maine	Fall and spring......	$1\frac{1}{4}$ bushel	....	Very little raised.
N. Hampshire.	September and April.	1 to 2 bush.....	July and August	15 to 20
Massachusetts.	August to September.	1 to $1\frac{1}{2}$ bush.....	....	12 to 25
Vermont.......	September..........	$1\frac{1}{4}$ to $1\frac{1}{2}$ bush. ..	Last July to August.	10 to 25
New York.....	Sept. 1 to November.	1 to 2 bush......	July 10 to 25........	10 to 25
New Jersey ...	September 1.........	1 bushel........	July 1..............	10
Pennsylvania ..	September 1 to 15...	1 to $1\frac{1}{2}$ bush.....	Last June to July ...	12 to 50
Maryland	October	1 bushel........	June	5
South Carolina.	October.............	$\frac{5}{8}$ bushel........	June	5
Georgia.......	September..........	$\frac{3}{4}$ bushel........	July	10
Alabama	October	$\frac{1}{2}$ bushel........	May................	5 to 10
Mississippi	September	$\frac{1}{2}$ bushel........	May and June.......	15
Tennessee	September 1	1 bushel........	June 15 to July	10 to 12
Ohio	Sept. and October...	1 to $1\frac{1}{4}$ bush.....	June to July........	12 to 22
Indiana	Sept. to October.....	1 to $1\frac{1}{4}$ bush.....	June 20 to July.....	12 to 30
Illinois........	Oct. and November..	2 to $2\frac{1}{2}$ bush.....	May................	20 to 25
Michigan......	October 10	$1\frac{1}{4}$ bushel	July 15.............	25
Iowa	September..........	2 bushels	July	15 to 25

TABLE—Continued.

OATS—Continued.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
White; do.; common black; black; do.	Loam and muck; loam; deep, black muck; rich, sandy loam.	25; 90; 100	$0 25 to 70
Napoleon; black	Sandy loam; clay	125; $\frac{2}{3}$	30 to 35
Irish; do.; black; do	Sandy loam; light; sandy; sandy loam; limestone; do.	All distilled; 30; 90; all; 90; 90.	31$\frac{1}{4}$ to 37$\frac{1}{2}$
Potato	Rich; moist	100	30 to 33
Poland; potato; ruffle	Dry loam; clay and lime; sandy loam; do.; do.	75; 80 or 90; 100; all; all; all.	20 to 70
Black	Moist; sandy	All; all	35 to 37$\frac{1}{2}$
White; black; do.; red	Slate loam	75; 99	20 to 50
Black	Sandy loam	All	25 to 50
Black	Light do; clay	All	37$\frac{1}{2}$
Ruffled; black and big	Black loam, thin	100; all	20 to 28
Black		All	25
Common, English, and Maine	Loose loam; do. do.; clay loam; sandy loam; oak and hickory loam.	Nearly all; 75; 75; all; all; all.	12 to 30
Side; common white; small white; black spreading; white and black do.; seed.	Sandy loam; loam; clay; do.; do.; do.; sandy.	All; all; 90; 75; 50; 50; $\frac{2}{3}$.	15 to 65
White, Scotch, seed, and potato black; do. white.	Sandy loam; light loam; sandy do.	68; 60; 50; 25; 95.	18 to 25
Common white; Scotch; Siberian; side; side.	Clay or sand; rich loam; sandy.	75; do.; do.; all; all.	18 to 35
White English Egyptian.		75	12$\frac{1}{2}$ to 20

RYE.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
Winter	New, burnt land	100	1 00 to 1 25
Common winter	Sandy; silicious; newly cleared land.	All; $\frac{3}{4}$	87$\frac{1}{2}$ to 1 00
	High, warm, light land	All	1 00
One kind	Light	All	75 to 1 00
Black	Sandy and slate; sand; sandy loam, or gravel; gravelly loam	All; do.; do.; do.	50 to 75
	Light, sandy loam	100	75
	Gravel; serpentine; stubble	All; 80	62$\frac{1}{2}$ to 1 00
	Light	100	70
Black	Gray land	All	1 00 to 1 50
White	Mulatto	90	50
Large white	Light		75 to 1 00
	Rich loam	All	1 25
White	Black, thin loam	100; all	50
Common white	Clay; clay; light, sandy, and warm; oak and hickory clay.	Nearly all; 80; 75; all; all.	30 to 48
Common white	Clay; do.; sandy loam	50; 50; all	33$\frac{1}{3}$ to 40
Ordinary	Dry; just cleared	100	20 to 25
	Clay or loam	80	28
White		100	25 to 50

TABLE—Continued.

BUCKWHEAT.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. per acre raised.
Maine	Middle of June......	$\frac{1}{2}$ bushel	....	20
N. Hampshire .	June	$\frac{1}{2}$ bushel	August; September..	15 to 20
Vermont	July 1..............	$\frac{1}{4}$ to $\frac{1}{2}$ bush......	September	15 to 25
New York.....	June 10 to July 20...	$\frac{1}{2}$ to 1 bush.	Sept. 15 to November	12 to 60
New Jersey ...	July 13 to last week in June.	$\frac{1}{2}$ to 1 bush......	September 15	6 to 15
Pennsylvania...	June 1 to last July..	$\frac{1}{4}$ to 1 bush.	Sept. 1 to Oct. 15...	20 to 40
Tennessee......	May 20	1 bushel........	October 15.........	15
Kentucky......	....	....	....	....
Ohio	Middle June to July 1	$\frac{1}{4}$ to 1 bush.	Sept. 20 to Oct. 1...	12 to 20
Indiana..	July 1 to August 1..	$\frac{1}{2}$ to 1 bush......	September to Oct. 1.	8 to 30
Illinois	June to July 1......	15 to 25 lbs.	September..........	15 to 40
Michigan......	June 15 to July 5....	$\frac{1}{2}$ to 2 bush.	Aug. 10 to Oct. 10..	15 to 40
Iowa	June 20	$\frac{1}{2}$ to $1\frac{1}{2}$ bush.....	September 20	8 to 10

INDIAN CORN.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. per acre raised.
Maine	May 20 to June 6 ...	....	September..........	30 to 40
N. Hampshire .	May 20.............	$\frac{1}{4}$ bushel	Sept. and October...	30 to 50
Massachusetts .	Last April to May 20	....	Last of Sept. to Oct.	35 to 40
Vermont......	May 10 to 20	6 to 8 quarts....	Sept. and October...	30 to 50
New York	May 1 to June 10...	4 to 12 qnarts...	Sept. to November...	15 to110
New Jersey ...	May 2 to 10	4 to 6 quarts....	Sept. 20 to Oct. 15..	22 to 60
Pennsylvania ..	April 15 to May 15..	$\frac{1}{8}$ to $\frac{1}{4}$ bush.	Sept. 15 to November	30 to 80
Delaware......	....	....	....	$28\frac{1}{2}$
Virginia	March 25 to May 15.	$\frac{1}{8}$ to $\frac{1}{4}$ bush......	Sept. and November.	10 to 80
South Carolina.	March and April....	1-10 bushel	October	8 to 15
Georgia	March 15 to May 1..	$\frac{1}{8}$ bushel........	October	15 to 50
Alabama.......	February to May 1..	1-10 to 1 peck...	Sept. and October ...	15 to 60
Mississippi.....	February to May....	....	October...........	30

TABLE—Continued.

BUCKWHEAT.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
....	....	100...........	75
Common; Indian	Silicious.....................	All	$0 50 to 75
....	....	All	42 to 50
Blue	Rich, sandy loam; sand and loam; deep, black muck; light sandy.	All; all; 100 ..	40 to 50
....	Sandy	$\frac{2}{3}$ to 100......	60 to 62½
Native; gourd seed	Slate; sandy loam; gravel or slate.	90; all; all; all.	40 to 65
....	Mountain..................	100...........	50
....	....	All	25
Common	Loose loam; sandy; black, thin, and stiff.	75; all; all; nearly all.	21 to 1 00
Common	Clay; black loam	All; all; 90; 100.	20 to 31
....	Sandy loam; wheat stubble; black muck.	50; 100; all...	30 to 50
....	Light loam; light sandy do..	All; all; 100; 75.	25 to 38
....	....	100...........	25 to 30

INDIAN CORN.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
North; yellow	Dry, warm, deep, clay loam; gravelly.	All; all	75 to 1 00
Yellow and flint; common 8 rowed.	Warm, rich, silicious; any except clay.	$\frac{3}{4}$; all; 75.....	75 to 1 00
White and yellow	....	....	80 to 90
Yellow; 12 rowed early; 8 rowed do.	Sandy loam; dry loam; black slate.	All; mostly consumed.	50 to 1 00
Small 8 rowed; 12 do.; 12 rowed yellow; yellow; 8 rowed white; long yellow; Dutton and 8 rowed yellow; do. and 8 rowed.	Gravelly loam; sand and loam; clay loam; black, gravelly; warm loam; gravelly; sandy loam; gravelly loam; do. with sand.	75; all; 75; 100	37½ to 75
12 to 8 rowed Jersey white; round white; yellow gourd seed.	Sandy loam; do............	All; $\frac{2}{3}$; $\frac{1}{3}$......	50 to 75
Yellow flint; do.; yellow bastard; yellow gourd seed; do.; do.	Sandy loam; sand and slate; limestone; sandy; do.; do.; loam; light; sandy; shale.	90; 75; all; 50; $\frac{7}{8}$; $\frac{2}{3}$; 48.	33 to 1 00
Gourd seed; do.; do.; do.; large Eard yellow; 8 rowed and gourd seed; yellow gourd seed; yellow bastard gourd seed.	Low bottom and sandy loam; sandy loam; do.	80; 60; $\frac{3}{4}$; all; 80; 85; 50.	33⅓ to 60
Tuscarora flint	Clay, sub-sod grounds and bottom lands.	75; 90........	40 to 75
Common....................	Red hickory land; red, black loam.	99; 95........	20 to 40
Yellow; common; gourd seed; white.	Alluvial; light	90...........	25 to 50
....	Rich bottom...............	More generally for sale.	50

TABLE—Continued.

INDIAN CORN—Continued.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av bush. per acre raised.
Tennessee.....	March to April......	1-10 bushel	Oct. and November .	35
Kentucky	April and May......	....	Oct. and November .	40
Ohio	April and May......	1-9 to ½ bush....	Oct. and November .	30 to 50
Indiana........	April 1 to May 1....	5⅓ qts. to 1¼ bu..	Oct. 1 to Nov. 30....	40 to 65
Illinois........	March to May 25 ...	6 to 10 lbs.	Oct. to December ...	35 to 80
Michigan......	May 1 to 20........	4 to 5 quarts....	Sept. 20 to Oct. 15..	20 to 40
Iowa...........	April and May.....	4 qts to ⅛ bush .	Sept. to November ..	40 to 60
Texas	February and March.	1-10 bushel	Early in Aug. to Sept.	25 to 50

POTATOES.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av bush. per acre raised.
Maine	April to June	10 bushels	September..........	50
N. Hampshire.	May to June 1......	10 to 15 bush....	Sept. and October....	75 to 100
Massachusetts	April and May......	10 to 20 bush....	Sept. and October...	100 to 150
Connecticut ...	April and May......	10 bushels	Sept and October...	50 to 100
Vermont.......	April 16 to June 30..	10 to 20 bush....	September..........	100 to 300
New York.....	April 15 to June.....	8 to 15 bush.....	Last May to Nov. 1 .	20 to 200
New Jersey ...	Last week in March to June 10.	2½ to 10 bush....	July 1 to Oct. 30....	40 to 200
Pennsylvania...	April and May......	2½ to 10 bush....	August to October...	100 to 200 & sw. 70
Maryland......	May................	10 bushels	September..........	100
Virginia	February to June 20.	2 to 10 bush.....	July to November ...	10 to 100 & sw. 120
South Carolina.	February to April...	3 to 5 bush.....	Sept. to December...	100 to 200
Georgia........	February to May....	3 to 5 bush.	Sweet, Oct. 15; common, October.	150 to 300
Alabama......	Sweet, April........	....	October.............	200 to 400
Mississippi.....	Sweet, April; common, January.	Sweet, 10 to 15; common, 4 bu	November...........	Sweet 80 & com. 50
Tennessee.....	April and May......	3 to 4 bush.	October 15..........	50 to 100
Kentucky......	April and June.....	....	....	....
Ohio	April to June 1	8 to 20 bush....	Sept. 15 to Oct. 30..	12 to 200

TABLE—Continued.

INDIAN CORN—Continued.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
White and yellow; white	Black loam; best	75............	20
....	....	All	25
Yellow; do.; do.; Dutton; large gourd seed; yellow gourd; Hackberry; Va.	Alluvium; do.; bottom land; do.; black ground; loam; sandy; black loam; loose land.	65; 90; 75; 75; $\frac{2}{3}$; all; $\frac{1}{2}$; all; 95.	10 to 60
Yellow and white; yellow dent; Hackberry; white Gregory; large white; do. and yellow; large Va.; white and yellow.	Rich, black loam; black loam; sandy bottom.	50; $\frac{3}{4}$; $\frac{3}{4}$; $\frac{3}{4}$; 75; 87.	16 to 37
Yellow; large yellow and white gourd; yellow and white; Va. gourd seed and Arkansas yellow.	Sandy loams; do.; alluvial bottoms; bottoms.	40 to 60; 75; 50; 50.	$12\frac{1}{2}$ to 25
Yellow and white flint; yellow dent; 8 rowed yellow dent.	Warm, sandy; intervale loam	All; all; 80; 50; 50.	25 to 44
Yellow flat; all kinds.........	....	75............	10 to 20
....	....	Nearly all....	25 to 30

POTATOES.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
Christie. do.	Dry	90............	50 to 67
Nova Scotia, mostly white, with specks of red; native whites; Rocky mountain.	Gravelly; old pasture land, without manure.	9-10..........	40 to 66
Chenango	Dry	All	65 to 75
....	....	....	50
Long Johns or pole; red leopard.	Loamy, if manured; sandy, with plaster; marl.	All	25
Long whites; Mercer; orange; pink eyes; do. do.	Black, gravelly; sandy loam; loam; dry, sandy loam and muck.	All; 75; all; 100.	30 to 75
Jersey yellow; Mercer; do.; do.	Sand; loose, sandy loam; loam.	All; 10; 25; 20.	50 to $62\frac{1}{2}$
Long red and boll blues; Mercers; do.; do.; do.; do. Bowie seedling.	Sandy loam; do.; light loam; light; common; sandy; do.	80; 50; all; all; all; 100.	40 to $87\frac{1}{2}$
Balt. blues; pink eyes; do.; early white; yam, Spanish, and Carolina red; Mercers.	Sand and loam; do.; calcareous loam.	All; all; all; 10	$37\frac{1}{2}$ to 75
Spanish; New England	Fresh light; grey moist.....	All; all.......	Sweet $37\frac{1}{2}$ Irish 1 00
Yams; red Spanish	Sandy; grey..............	All; 99	$0 15 to 1 00
Yams and Spanish	Light.....................	All	$37\frac{1}{2}$ to 1 00
Yams and Bermudas........	Sandy loam................	All	Sweet 50 & com. 1 00
Yams, nigger killers, &c.; yellow; London; ladies.	Clay; sandy; rich	100; all	$33\frac{1}{3}$ to 50
....	....	....	50 to 75
Murphy blues; black kidneys; yellow, white, red, and blues; yellow round; Mercers.	Bottom; loam; sandy, stiff; rich; alluvial.	80; all; all; all; 75.	25 to $62\frac{1}{2}$

TABLE—Continued.

POTATOES—Continued.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. lbs. or tons per acre raised.
Indiana	May 1 to June 20	3 to 20 bush.	July 1 to last Sept.	5 to 300 & sw. 100
Illinois	March and June	Common, 8 to 12; sweet, $\frac{1}{4}$ to $\frac{1}{2}$ bush.	August and October.	Sweet 150 to 200 Com. 75 to 300
Michigan	May 1 to June	5 bushels	October 10	150
Iowa	April and May		Sept. to November 1.	100 to 150
Texas	February 1 to 20			

HAY.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Tons.
Maine			July 15 to August 15.	1 to $1\frac{1}{2}$
N. Hampshire		$\frac{1}{4}$ bushel	July and August	1 to 4
Massachusetts.	April and May	10 lbs. clover; 1 peck timothy.	July and August	1
Vermont			July and August	1 to 5
New York		$\frac{1}{2}$ bushel	June 25 to Aug. 20.	1 to $1\frac{1}{2}$
New Jersey	March 1	$\frac{1}{4}$ bushel	June and July	$1\frac{1}{4}$ to 2
Pennsylvania		$\frac{1}{8}$ bushel	June and August	1 to $2\frac{1}{2}$
Maryland			July	1
Virginia	In the fall	6 lbs. clover; 4 lbs. timothy.	June to August 15	1 to 3
Tennessee	August 10	1 bushel	June and July	2
Kentucky				2
Ohio	September or March.	1-10 to $\frac{1}{8}$ bush.	Last June to Aug. 1.	1 to 2
Indiana	September to Feb. 1	4 to 10 quarts	June to August 1	1 to 3
Illinois	February	10 quarts	June and August	2 to 3
Michigan			July 1 to October 10.	$1\frac{1}{2}$ to 3
Iowa		6 lbs.	June 1 to July 1	$1\frac{1}{2}$

TABLE—Continued.

POTATOES—Continued.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
Merino; Neshawno; Spanish sweet; whites; long reds; round blues; do.	Rich, dry, sandy loam; sandy; black loam; light, sandy; black loam.	75; $\frac{3}{4}$; 80; 100; all; 75 com.; 100 sweet.	$0 15 to 30
Pink eyes; yellow Spanish; Irish greys; blues and Mercers; pink eyes; London ladies, (sweet;) yams and Spanish.	Wet clay; new and alluvial; sandy.	Sw. 50 to 75; 80; com. 50 to 65; 100; 50.	Sweet 50 to 75 & com. 25 to 37$\frac{1}{2}$
Mercers; yellow; pink eyes; do.; Irish greys.	Intervale; muck or loam....	All; all; 100..	56
Chenango; Mercers or blue skins.			
....	....	90..........	25

HAY.

....	....	....	6 00 to 6 50
Timothy; herds grass and brown top; timothy; do. and clover.	Diluvial and moist; clay; moist.	Nearly all; $\frac{1}{4}$; all.	5 00
Timothy, clover, and red top.	Cultivated meadows........	All	12 00
Clover and herds grass	Wet....................	....	5 00 to 6 00
Timothy and clover; do.; do.; do.	Deep, black muck; clay loam; moist alluvial.	All; 75.......	5 00 to 12 00
Clover and timothy; timothy, herds grass, and clover.	Meadow; sandy loam.......	70; all........	10 00 to 14 00
Timothy; do.; do.; timothy and clover mixed; do.; do.	Limestone; light loam; sandy loam; clay for timothy; loam for clover.	All; all; 90; 80; 70; 100; 25 to 30; all.	5 00 to 16 00
Clover; do.; timothy; timothy and orchard grass.	Sandy loam for timothy; clay for clover; sand and loam; limestone.	All; all; 80 ...	5 00 to 10 00
Herds grass and clover; timothy and herds grass.	Low swamp for herds grass; rich clay for clover.	All	5 00
....	....	All	6 00
Timothy and clover; do.; do.; timothy and blue grass; timothy and red clover.	Loose land; bottom; black swamp; clay loam; clay; do.; limestone.	100; all; all; all; all; 100.	3 00 to 8 00
Timothy and clover; do. do. and red top; timothy do. do. and herds grass and clover; timothy do. do.	Sandy; stiff table land; clay; damp clay; clay; do.	All; all; nearly all; 75; all; all.	5 00 to 6 00
Timothy and red clover; do. and red top.	Wet clay; sandy	All; 100......	4 00
Timothy and clover	Clay; do.................	All	5 00 to 8 00
Clover and herds grass; timothy and clover.	....	95	3 00 to 5 00

TABLE—Continued.

HEMP OR FLAX.

States.	Time of sowing or planting.	Average bushels or pounds of seed per acre.	Time of harvest.	Av. bush. or pounds per acre raised.
Vermont	May	½ bushel	July.	
New York	April	½ to 1 bush	July and August	10 bu. seed
Tennessee	April 4	2 bushels	May 20	250 lbs
Ohio	April to May 1	1 to 2 bush	Last July to August.	1 ton
Indiana	April 1	½ to 1 bush	July 1	1,000 to 2,000 lbs.
Michigan	April 15 to May 20		September 1	

TOBACCO.

				Pounds
Maryland	May to August		September	1,000
Virginia	May to June			1,000
Tennessee	February 20		August 1 to Sept. 20.	1,000
Ohio	April	1 bushel	August	1 ton.
Indiana	June		September	800
Illinois	February		September	1,000 to 1,500

COTTON.

Virginia	May 1	2 bushels	Oct. 1 to Dec. 15	800 to 1,000
South Carolina	April	75 pounds	Sept. 1 to end Dec.	300 to 400 wool and seed.
Georgia	April 1	2½ bushels	Fall	200 to 1,000
Alabama	March and April	1 to 4 bush.	Fall and winter	700 to 1,000
Mississippi	Mar. 15 to April 15.	3 bushels	August till March	1,500 seed, or 400 cleared.
Tennessee	April 20 to May 1	2 bushels	October	500 to 700
Texas	March and April	Not material, if plenty.	August 1	800 to 1,500

RICE.

				Bushels.
South Carolina		100 pounds	September	40
Alabama	March	½ bushel	September	20 to 30
Tennessee	April 20	2 bushels	August	

TABLE—Continued.

HEMP OR FLAX.

Kinds most successful.	Best soil.	Average per cent. consumed where raised.	Price.
	Clay sand; alluvial	All	$1 $12\frac{1}{2}$ per cwt.; 9 per lb.
Sapling		100	25 per lb.
Flax better than hemp	Sandy		$5 to $8 per ton
Sapling; common	Loam; clay	100; all	$2 per 100 lbs.;
		All	10 cts. per lb. 62 cts. per bu.
TOBACCO.			
	Sandy loam	5	$2 per 100 lbs.
		1	4 cents per lb.
	Rich	75; 5	2 to 10 cts. per pound.
	Hickory and white oak		10 to 12 cents per pound.
Broad leaf	Loam	10	$3 per 100 lbs.
Thick set, long green, and black tongue.	Manured lots	20	2 to $4\frac{1}{2}$ cents pound.
COTTON.			
			Per pound. $0 07 to $7\frac{1}{2}$
Petit gulf, long stubble, or Sea island.	Dry and light		15 to 17 for seed. 6
Petit gulf or Alvarado	Sandy; do	5; 10	3 to 6
Petit gulf; green seed	Grey		Varies.
Mexican and brown seed	Black loam	Very small	4 to 6
Common Mexican and Mastodon	Clay; light	100; all	2; seed 3
RICE.			
Gold seed		30	70 to 80 cents. per bush.
Bearded	Branch lands		75 cts. per bu.
	Swamp	100	10 cts. per lb.

COST PER BUSHEL FOR RAISING, AND CONSUMPTION PER INDIVIDUAL.

New Hampshire.

Sullivan county.—Oats, 30 bushels to the acre; cost, 30 cents per bushel; worth 40 cents per bushel.

Cheshire county.—Cost of raising wheat, $1 per bushel; Indian corn, 50 cents; potatoes, 25 cents. Probable average consumption of wheat, 1 bushel; corn, 2 bushels; rye, 1 bushel; potatoes, 5 bushels; beef, 20 lbs.; pork, 25 lbs.

Vermont.

Windsor county.—Cost of raising Indian corn, (say 40 bushels per acre,) 28 cents per bushel; price, 67 cents. Cost of producing rye, (16 bushels per acre,) 30 cents per bushel; value, 75 cents per bushel. Oats, (45 bushels per acre,) 17 cents; value, 34 cents per bushel. Cost of producing hay, ($1\frac{1}{2}$ tons per acre,) $3 per ton; valued at $6 per ton. The above do not include charge for manure.

Massachusetts.

Essex county.—Cost of raising Indian corn per bushel, 75 cents.

New York.

Yates county.—Cost of raising wheat per bushel, 55 cents.

Ulster county.—Cost of raising rye per bushel, 19 cents; corn, 19 cents; buckwheat, 13; oats, 13 cents; potatoes, 10 cents. Wheat, per individual, about 3 bushels; little corn; potatoes much used; beef, 150 lbs.

Madison county.—Cost of raising Indian corn, a little over 18 cents per bushel. The profit on 2 acres 3 roods and 25 rods, in this case, was $90 11, allowing the corn fodder to pay the expense of harvesting.

New Jersey.

Camden county.—Cost of raising wheat per bushel, 25 cents; corn, 20 cts. Average consumption of wheat, 200 lbs; Indian corn, 2 bushels; potatoes, $3\frac{1}{2}$ bushels; beef, 100 lbs; pork, 100 lbs, &c.

Monmouth county.—Cost of raising corn, $31\frac{3}{5}$ cents per bushel; wheat, $56\frac{1}{4}$ cents; potatoes, $21\frac{5}{8}$ cents.

Pennsylvania.

Lancaster county.—Cost of raising wheat per bushel, 80 cents; corn, 40 cents; oats, 20 cents. (By Joseph Leaman: cost of raising wheat, 90 cents; corn, 25 cents.) Average consumption of each individual, 6 bushels wheat, 2 of corn, 5 of potatoes; beef, 100 lbs; pork, 100 lbs.

Delaware county.—Cost of raising 1 bushel wheat, \$1 02; per acre, \$5 25. Cost of raising 1 bushel Indian corn, 20½ cents; per acre, \$6 50. Cost of raising 1 bushel potatoes, 36½ cents; per acre, \$20. Cost of raising oats per acre, \$2 50. Consumption per individual above 10 years of age: 180 lbs. of animal food; 8 bushels wheat; 2 of corn and buckwheat; 3 of potatoes; 20 lbs. butter, &c. Children under 10 years, one half: consumption per individual, 3 bushels wheat; Indian corn, 2 bushels; potatoes, ½ bushel; beef, 100 lbs.

Fayette county.—Average consumption: of 5 bushels of corn, about 3 bushels per annum. Cost of raising wheat, 40 to 44 cents per bushel; Indian corn, 12½ to 15 cents; oats, 12½ cents.

Franklin county.—Cost of raising wheat per bushel, not including interest on capital, 70 cents; ditto of Indian corn, ditto, 25 cents. Supposed consumption: wheat, 4 bushels; corn, 3; potatoes, 3; beef, 60 lbs. per individual.

Virginia.

Princess Ann county.—Cost of raising corn, 35 cents per bushel, including transportation to market; 20 bushels per acre, \$7; price obtained, 60 cents; 20 bushels per acre, \$12; cost, \$7; profit, \$5. Cost of raising oats per bushel, 33 3-15 cents per bushel; 15 bushels per acre, \$5; price, 40 cents; 15 bushels, \$6; cost, \$5; profit, \$1. Cost of raising and carrying to market of 1 bushel of wheat: average yield, 10 bushels, 65 cents per bushel, \$6 50; price obtained, \$1; 10 bushels, \$10; cost, \$6 50; profit, \$3 50.

Amherst county.—Cost of raising wheat, allowing 10 or 15 bushels to the acre, about 40 cents per bushel. On account of liability to injury, add 50 per cent., say 60 to 65 cents per bushel. Cost of raising corn per bushel, 40 cents. Of tobacco, \$4 per hundred. Consumption of corn, including feed to stock, 30 to 35 bushels to a person. Of wheat, not more than 3 bushels.

Southampton county.—Three barrels of corn and 251 pounds of bacon, is the allowance for an able bodied man per annum. Peas and potatoes substitute for from a fourth to one-third of the allowance of bread.

South Carolina.

Newberry county.—About 60 cents for wheat; 30 cents for Indian corn. Each individual supposed to consume 2 bushels of wheat, 8 of Indian corn, 10 of sweet potatoes, 150 pounds of pork, and 50 of beef.

Georgia.

Walker county.—Cost of raising 1 bushel wheat, 50 cents; corn, 20 cents; potatoes, 10 cents.

Hancock county.—Cost of raising 1 bushel wheat, 60 cents; corn, 30 cents; oats, 25 cents. Allowance for consumption per individual, 180 pounds pork, 50 pounds beef, and 15 bushels of corn.

Alabama.

Jackson county.—Cost of raising Indian corn, 50 cents per bushel

Mississippi.

Copiah county.—Indian corn can be advantageously raised at 25 cents per bushel; 12 to 15 bushels of Indian corn for an individual. Average consumption, beef or pork, 200 to 250 pounds per annum.

Tennessee.

Pikeville, Bledsoe county.—Cost per bushel for wheat 50 cents; Indian corn, 10. Consumption of each individual, 2 bushels wheat, 5 bushels Indian corn, 2 bushels potatoes, 100 pounds beef, 200 pounds pork.

Jacksonboro', (E. T.)—A family of six persons—30 bushels of Indian corn, 20 of wheat, 30 of Irish and sweet potatoes and turnips, 200 pounds pork, 200 pounds beef, and 8 dozen poultry, per annum.

Kentucky.

Greenup county —Cost of raising wheat per bushel, 50 cents; corn, 20 cents; oats, 16⅔ cents; rye, 40 cents; potatoes, 16 cents.

Average consumption per person, 5 bushels wheat, 10 corn, 15 potatoes, beef 200 pounds, or 150 pounds pork.

Ohio.

Morgan county.—$8 per acre for raising wheat and corn, including seed, &c., and carrying to market. Wheat, average 20 bushels to the acre; corn, 34 bushels, and so $8 ÷ 20 = not quite 40 cents per bushel for wheat; $8 ÷ 34 = not quite 34 cents per bushel for corn.

Consumption, before failure, of potato crop, 7½ bushels of wheat to each individual; corn, 2; potatoes, 3; 5 of fruits, per year; now 5 of wheat, 6 of corn, 1 of potatoes, and 6 of fruit.

Delaware county.—50 cents for wheat, 16 cents for corn.

Indiana.

Wayne county —Cost of raising wheat per acre, $4 75 to $5. Average, 15 bushels, or 30 to 33¼ cents per bushel. Cost of raising corn per acre, $5 62. Average 40 to 50 cents per bushel; or 12 to 14 cents per bushel.

Consumption, including adults and children both—wheat, 7 bushels; corn, 4⅔; potatoes, 1⅓, beef, 150 pounds per person; pork, 100 pounds.

Marion county.—Consumption, estimated per individual, three bushels wheat, 7 of corn, 50 pounds beef, 150 of pork.

White county.—Cost of raising wheat, 48 to 54 cents per bushel; corn, 20 cents; oats, 16 cents. Probable average consumption per individual, (true Hoosier family,) 400 pounds pork, 6 bushels wheat, 15 pounds coffee.

Bartholomew county.—Cost of raising corn, 11 cents; wheat, 35 cents.

Illinois.

Cost of raising wheat, $4 per acre; or 22½ cents per bushel. Sod wheat per acre, $5 50—large crop; oats, about $4 30 per acre; 40 bushels, or about 11 cents per bushel.

Consumption estimated at 10 bushels wheat, 2 bushels corn, 5 bushels potatoes, and 200 pounds beef and pork.

Michigan.

Hillsdale county.—Cost of wheat per bushel, about 40 cents; corn, 20 cents.

Plymouth county.—Cost of raising 1 bushel of wheat, 52 9 20 cents; 18 bushels to the acre. Cost per acre, $9 40; price of 18 bushels, at 75 cents per bushel, $13 50; profit $4 10 per acre. Cost of raising 1 bushel of corn, 19 6 10 cents; 40 bushels to the acre. Cost per acre, $7 85; 40 bushels, at 30 cents per bushel, $12; profit, $4 15 per acre. Cost of raising oats, per bushel, 15 4-10 cents; 40 bushels cost, per acre, $6 10; 40 bushels, at 22 cents per bushel, $8 80; profit, $2 70 per acre. Consumption of each individual, average 7 bushels of wheat.

Monroe county.—Cost of raising wheat, 24 2-10 cents per bushel; price received $1 03 to $1 06, at 25 bushels per acre; about $6 25 per acre received above $26; profit, $20 per acre.

Washtenaw county.—Cost of raising wheat, 35 cents per bushel; corn, 20 cents.

Wayne county.—Cost of raising wheat per bushel, 52 9-20 cents; corn, 19 5-10 cents; oats, 15 4 10 cents per bushel.

Iowa.

Henry county.—Cost of raising a bushel of wheat, 45 cents; for 15 bushels, $6 89; price obtained for 15 bushels, $9; net gain, $2 11, or 15 cents per bushel. Cost of corn per acre, $2 87½ for 40 bushels, or 7 cents per bushel; price obtained, $4 20 for 40 bushels, or 5 cents gain per bushel; net gain, $1 33½ per acre.

PROPORTION OF CULTIVATED AND UNCULTIVATED LAND.

New Hampshire.

Charlestown.—Twenty per cent. in cultivation.

Sullivan county.—Twenty per cent. cultivated, or not more than 1 acre in 50 cultivated with the plow.

Rockingham county.—Ninety per cent. cultivated.

Cheshire county.—One hundred per cent. cultivated.

Vermont.

Hyde Park, Sullivan county.—One-third a wilderness; one-tenth cleared land, tilled.

Franklin county.—Fifty per cent. cultivated.

Massachusetts.

Bristol county.—Fifty per cent. cultivated.

New York.

Monroe county.—Seventy-five per cent. cultivated.

Yates county.—Seventy per cent. cultivated.

Erie county.—Sixty per cent. cultivated.

Suffolk (L. I.) county.—Thirty per cent. cultivated.

Rensselaer county.—Seventy-five per cent. cultivated.

Orleans county.—Sixty-four per cent. cultivated.

New Jersey.

Camden county.—One-fourth to one-half cultivated. Cultivated to uncultivated, as 2 to 1 = $\frac{2}{3}$.

Mercer county.—Seventy-five per cent. cultivated.

Monmouth county.—In the north end and central portions of our county, say two-thirds cultivated and one-third uncultivated. In the southern and northern parts the proportion is nearly reversed, not more than one-third cultivated.

Pennsylvania.

Delaware county.—About 80 per cent. cultivated.

Lancaster county.—About 90 per cent. cultivated.

Adams county.—Ninety per cent. cultivated.

Dauphin county.—About 40 per cent. cultivated, the balance mountainous, unfit for cultivation.

Fayette county.—Except mountain districts, about $33\frac{3}{4}$ per cent. cultivated (one third.)

Franklin county.—Probably about one-half cultivated.

Maryland.

Prince George county.—Fifteen per cent. cultivated.

Virginia.

Princess Ann county.—Twenty per cent. cultivated.

Sussex county.—One-fourth cultivated.

Brooke county.—Forty or 45 per cent. cultivated.

Ohio county.—Sixty per cent. cultivated.

Mononghalia county.—Thirty-three per cent. cultivated, not including woodland.

South Carolina.

Newberry district.—About one-third in cultivation.

Upper South Carolina.—About 40 per cent. cultivated.

Georgia.

Cass county.—10 per cent. cleared and under cultivation.

Carroll county.—50 per cent. cultivated.

Walker county.—30 per cent. cultivated.

Alabama.

Jackson county.—1-25 cultivated.

Mississippi.

Copiah county.—$\frac{1}{3}$ to $\frac{1}{2}$ cultivated.

Tennessee.

Pikeville, Bledsoe county.—$\frac{1}{4}$ cultivated.

Smith county.—50 per cent. in cultivation.

Sheddyville, East Tennessee.—Uncultivated 50 per cent. over cultivated.

Kentucky.

Greenup county.—$12\frac{1}{2}$ per cent. cultivated.

Ohio.

Highland county.—10 per cent. cultivated.

Licking county.—A little over $\frac{1}{3}$ cultivated.

Morgan county.—$33\frac{1}{3}$ per cent. cultivated.

Defiance county.—1-25 cultivated.

Richland county.—66 per cent. cultivated.

Wayne county.—About 50 per cent. cultivated.

Tuscarawas county.—50 per cent. cultivated.

Delaware county.—50 per cent. cultivated.

Indiana.

Wayne county.—60 per cent. cultivated.
Laporte county.—$\frac{1}{4}$ to $\frac{1}{3}$ per cent. cultivated.
Marion county.—33 per cent. cultivated.
Bartholomew county.—35 per cent. cultivated.
Wabash county.—$\frac{1}{8}$ per cent. cultivated.
Orange county.—About 10 per cent. cultivated.
Noble county.—About $\frac{1}{4}$ of the county in cultivation.
White county.—5 per cent. cultivated.

Illinois.

Union county.—$\frac{1}{8}$ per cent. cultivated.
Jackson county.—1-20 or 1-25 cultivated.
Randolph county.—Between 16 and 17 per cent. cultivated.
De Witt county.—10 per cent. cultivated.
Putnam county.—1-10 cultivated; some 1-15; some 1-25.

Maine.

West Ripley.—25 per cent. cultivated.

Michigan.

Oakland county.—40 per cent. cultivated.
Hillsdale county.—25 per cent. cultivated.
Monroe county.—Probably 1 5 cultivated.
Washtenaw county.—20 per cent. cultivated.
Wayne county.—20 per cent. cultivated.

Iowa.

Henry county.—About 1-10 cultivated.

Texas.

Grimes county.—1,180 square miles, or 755,200 acres; 10,595 acres, or 1.4 per cent. in cultivation.

PROPORTION AND VALUE OF CORNSTALK AND STRAW FODDER.

Maine.

Ripley county.—20 bushels per ton, worth about $2 50 for stable use and fodder.
Sullivan county.—3 tons to 40 bushels; value, $2 per ton.

New Hampshire

Rockingham county.—Value per ton, $5.
Cheshire county.—Value of cornstalk and straw fodder, $2 per ton.

Vermont.

Rutland county.—Value of cornstalk and straw fodder, $4 per ton.

Hyde Park, Lamoille county.—$5 per ton.

Massachusetts.

Bristol county.—Value of stalk fodder per ton, $6.

New York.

Niagara county.—Value of cornstalk fodder, $5 per ton.

Monroe county.—100 lbs. of straw and fodder to 1 bushel of grain; about 1 ton per acre, at $3 per ton.

Erie county.—Value of cornstalk and straw fodder, $3 50 per ton.

Madison county.—Value of cornstalk and straw fodder, one-half the value of hay, (hay, $6 to $8 per ton;) thus, $3 to $4 per ton.

Sullivan county.—Value of cornstalk and fodder, $3 per ton.

Ulster county.—Value of cornstalk and fodder, $5 per ton.

Suffolk county, (L. I.)—Straw fodder worth $3 per ton; cornstalk, $2 per ton.

New Jersey.

Camden county.—4 tons of cornstalk to 100 bushels; value, $1 per ton. 40 to 50 lbs. of straw to 1 bushel wheat; ½ to ¾ cent per lb. Straw, 1 ton to 25 bushels; cornstalk, 1 ton to 20 bushels corn. Value of straw fodder, $10 per ton; stalk, $2 per ton in Philadelphia.

Mercer county.—Value of cornstalk and straw fodder, $2 per ton.

Monmouth county.—Value of cornstalks and straw fodder, 75 cents on the fields; 1 load stalks to 1 load of corn.

Pennsylvania.

Delaware county.—Value of cornstalk, $2 per ton; straw fodder, $7 per ton; 1 ton per acre.

Adams county.—1 ton of cornstalk fodder to 100 bushels of corn, and 1 ton of straw of wheat or rye per 25 bushels grain; value, $5 per ton.

Dauphin county.—Cornstalk fodder, worth $4 per ton; rye straw, $8 per ton; tangled straw, $5 per ton.

Fayette county.—Value of cornstalk and straw fodder, $4 per ton.

Franklin county.—Proportion of cornstalk and straw fodder, 75 per cent. more than grain at $5 per ton. Wheat, 12 bushels; oats, 30 bushels; corn, 35 bushels per acre.

Maryland.

Prince George county.—Proportion of cornstalk and straw fodder to grain, 50 to 1; value, $2 per ton.

Virginia.

Princess Ann county.—Cornstalk fodder, 200 lbs. per acre; average price, $1 per 100 lbs.

Brooke county.—Cornstalk and straw fodder valued at $2 to $3 per ton.

Buckingham county.—Proportion of cornstalk and straw fodder to grain, 20 to 1; value, $1 per ton.

Monongalia county.—Proportion of cornstalk and straw fodder to grain, supposed to be 1 10; value, $2 per ton.

South Carolina.

Newberry district.—Proportion of cornstalk to grain, 19 lbs. to 1 bushel corn; 150 lbs. per acre.

Upper South Carolina.—Value of dried corn blades, 75 cents to $1 per 100 lbs.

Georgia.

Cass county.—Proportion of cornstalk and straw fodder to grain, 100 lbs. to 1 bushel; value, $1 per ton.

Walker county.—Value of cornstalk and straw fodder, $10 per ton.

Hancock county.—100 bushels of corn will yield about 1,800 lbs. of fodder of stalks, &c.

Alabama.

Barbour county.—200 lbs. of stalks to 20 bushels corn per acre, worth 50 cents per 100 lbs.

Tennessee.

toPikeville, Bledsoe county.—Proportion of cornstalk and straw dder, $\frac{1}{3}$; value, $20 per ton; 200 lbs. to the acre.

Kentucky.

Greenup county.—Proportion of cornstalk to corn, $\frac{1}{4}$; value, $2 per ton.

Ohio.

Highland county.—Average value of cornstalk fodder and straw, $3 per ton.

Richland county.—Proportion of cornstalk and straw fodder to grain, 6-10; value, $3 per ton.

Defiance county.—Value of cornstalk and straw, $1 50 per ton.

Indiana.

Laporte county.—Proportion of fodder to grain, ¼; value, $1 per ton.

Marion county.—Value of cornstalk and straw fodder, $1 per ton.

Wabash county.—Value of cornstalk and straw fodder, $2 per ton.

Noble county.—Value of cornstalk and straw fodder, $1 50 per ton.

Michigan.

Washtenaw county.—Proportion, 1-5 straw, 1-5 oats or corn; value, $5 per ton.

MOST APPROVED ROTATION OF CROPS.

Maine.

Waldo county.—1, oats; 2, corn, or potatoes, manured; 3, wheat, and then hay from 5 to 10 years.

West Ripley.—Peas and oats; corn, wheat, and hay pasture.

New Hampshire.

Sullivan county.—1st, after ploughing, oats; then, 2d, corn, well manured, 40 loads to the acre; 3d, wheat; grass the 10 years following.

Rockingham county.—Hay, corn, potatoes, grain, grass.

Cheshire county.—Indian corn, or roots; small grain and grass.

Massachusetts.

Bristol county.—Corn, potatoes, and other vegetables, with hay.

Vermont.

Hyde Park, Lamoille county.—Grass land, ploughed first—crop, oats, corn, or potatoes; then wheat; then grass.

Franklin county.—Oats, peas, and potatoes; corn, with manure; wheat, with grass seed; to remain 3 to 5 years. Thought to be a good one by some.

Rutland county.—Corn, on sward; followed by oats, or wheat; then clover.

New York.

Niagara county.—Timothy and clover, mown and pastured; corn, and potatoes; barley, and oats, and peas; wheat, after barley and peas, with grass seed.

Monroe county.—Wheat, clover, corn, oats, or barley and wheat; 10 acres of wheat to 1 of corn or barley.

Erie county.—Corn, wheat, oats, or barley; clover and grass.

Suffolk, (L. I.)—Corn, oats, wheat.

Madison county.—Corn, on sward; then barley, or oats; and, before the weevil was so destructive, next sowed wheat in the fall; and in the spring sowed clover, with herds' grass.

Rensselaer county.—Corn, or potatoes; oats, flax, or barley; rye, or wheat; grass 3 years, and then corn again.

Sullivan county.—Corn, oats, grass, buckwheat; followed by the same crops; rye generally raised on summer fallow.

New Jersey.

Camden county.—1, corn, or potatoes; 2, of corn, potatoes next; 3d, wheat; 4, 5, 6, grass, (clover or timothy.) Common method, corn, oats, wheat, grass.

Mercer county.—Corn, oats, wheat; from 2 to 3 years in grass; then corn, &c.

Monmouth county.—3 years' rotation: 1, corn; 2, potatoes; 3, small grain, and seeded with clover or clover and timothy.

Pennsylvania.

Philadelphia county and vicinity.—Corn, oats, wheat, or grass.

Delaware county.—Corn, oats, wheat, clover and timothy mixed successively. The sod broken up in the fall or spring, planted with corn or oats, sown following spring, followed with wheat in the fall, seeded by natural grasses and pasturage.—(See also report of I. Edwards and M. Painter.)

Lancaster county.—2 or 3 years in grass; then corn, oats, and wheat, in succession; then in grass again. Grass, corn, oats; then wheat; 2d or 3d crop in succession; then grass, clover, and timothy again.

Adams county.—Fallow, after lying 2 years turned for corn, levied at 100 bushels per acre, then thoroughly worked in; corn the following spring, sown in oats; after the oats, manured with stable manure; then cropped with wheat; then turned, after the wheat, and recropped with Mediterranean wheat, and set in clover.

Dauphin county.—Corn, oats, wheat, with manures; then grass.

Fayette county.—Corn, oats, wheat, clover and timothy; clover and timothy to be ploughed down 2d or 3d year.

Franklin county.—From grass land, corn; followed by oats; then manured, and followed with wheat; then laid in clover and timothy.

Virginia.

Princess Ann county.—1, corn; 2, wheat, or oats; 3, clover, or peas—or, 1, corn; 2, oats and wheat; then return to corn.

Brooke county.—Indian corn, upon a clover lay; then oats, bottomed by wheat; upon which clover is again sown, and continued for 2 years.

Buckingham county.—Corn, wheat, clover.

Monongalia county.—Corn, wheat, and clover.

South Carolina.

Newberry district.—Indian corn; 2, wheat, with red-cow pea or cotton. Each one year in succession.

Upper South Carolina.—No established one. Most common maize and small grains alternately. Sometimes cotton, corn, small grain; and a few rest the 4th year.

Georgia.

Cass county.—Corn, after small grain; wheat is after cotton, and open fallowed land.

Carroll county.—Corn, wheat, and cotton.

Walker county.—Clover, wheat, or small grain; Indian corn, potatoes, or cotton.

Alabama.

Barbour county.—1, corn; 2, small grains; 3, cotton.

Jackson county.—Cotton, corn, wheat, or oats.

Mississippi.

Copiah county.—Cotton, corn, oats.

Tennessee.

Pikeville, Bledsoe county.—1, corn; 2, wheat; 3, rye; 4, oats and grass.

Smith county.—Tobacco, wheat, corn, oats.

Sheddyville, East Tennessee.—Corn, wheat and oats, clover, &c.

Kentucky.

Greenup county.—Corn, wheat, rye, or oats, clover.

Ohio.

Highland county.—Grass, timothy; seed clover in fall; wheat next spring; oats or potatoes; then wheat; then timothy, &c.

Licking county.—Corn, wheat, clover, or grass, or vice versa.

Morgan county.—On limestone lands: wheat on newly cleared

land and seeded with clover; 2d year, clover; 3d and 4th, wheat; and so on, two crops of wheat and one of clover for any number of years. When the first crop of wheat comes off, the stubble is pastured lightly; next year, the first crop of clover is mown. The second crop, which contains the seed, is plowed under; after harvest, the stubble is broken up, which brings to the surface the seed ploughed under the fall before; it springs up and grows; so that land once seeded in clover needs no additional seed under this course of crops. On the soils, corn, oats, wheat, followed by wheat, then clover.

Defiance county.—Corn, oats, clover, wheat, and corn.

Richland county.—Corn, wheat, grass.

Wayne county.—Corn, wheat and clover, and then wheat, though some of the soil will give good crops of corn for 15 or 20 successive crops.

Delaware county.—A few crops of corn, oats, wheat, and grass.

Indiana.

Wayne county.—Clover, corn, oats, wheat, and grass.

Laporte county.—Wheat, corn, oats, clover; rest two or three years; then wheat, seeded with clover, turn over sod, and sow with wheat.

Marion county.—Corn, oats, wheat, and then sow down with clover, or grass, to suit the soil, or the kind of stock you wish to pasture.

Bartholomew county.—Corn, oats, wheat, clover.

Wabash county.—Corn, or wheat, clover, wheat, corn.

Orange county.—Indian corn for the 1st year's tillage, then oats, followed by wheat.

Noble county.—Wheat, corn, or oats, rye, &c.

Greene county.—Clover, wheat, corn, and oats.

Illinois.

Putnam county.—Two crops of corn, one of wheat, one of oats, and one of grass.

Jackson county.—Corn, oats, wheat, and clover.

Randolph county.—Oats, wheat.

Michigan.

Wayne county.—Green sward, corn, and wheat.

Oakland county.—Clover, corn and wheat and clover, wheat and corn.

Hillsdale county.—Wheat and corn, wheat.

Monroe county.—Recommends wheat after barley.

Washtenaw county.—Wheat, summer fallow, wheat, oats, corn, clover with plaster.

PRICES OF ARTICLES, DAIRY, &c.

Maine.

Piscataquis county.—Peas, 75 cents per bushel; beans, $1; apples, 25 to 30 cents; butter, 12 to 15 cents; cheese, 7 to 9 cents; beef, 4 cents; skins, 4 cents per pound; sheep, value, average per head, $1; average wool to a sheep, 3½ pounds; price, 25 cents; sheepskins, 25 to 50 cents apiece; eggs, 8 to 10 cents per dozen.

Waldo county.—Apples, 75 cents to $1 per bushel; butter, 14 cents per pound; cheese, 9 cents per pound; wool, average per fleece, 3 pounds; price, 25 cents per pound; mutton, 3 to 4 cents per pound; fowls, average per family, 20, at 17 cents each; eggs at 14 cents per dozen.

New Hampshire.

Charlestown.—Peas, $1 50 per bushel; apples, natives, 25 cents, grafted, 50 cents per bushel; strawberries, 12½ cents per quart; butter, 16 to 18 cents per pound; cheese, 6 to 9 cents per pound. Horses, in 1847, 326, valued at $15,115. In 1848, 393, valued at $21,555. Cattle, in 1848, 843, valued at $26,503. Beef, 6 to 9 cents per pound; sheep, 7,480, valued at $9,149; mutton, 5 to 7 cents per pound; hogs, 3½ to a family; average weight, 250 pounds; price per pound, live weight, 5 to 6 cents; pork, 5 to 10 cents; fowls, 12 to a family, 7 cents per pound; eggs, 24,000, 16 cents per dozen; honey, 30 pounds per hive, at 17 cents per pound.

Sullivan county.—Beets, 25 cents per bushel; carrots, 30 cents; turnips, 25 cents; peas, $1 25; beans, $1 25 per bushel; apples, 34 cents per bushel.

Rockingham county.—Beets, 50 cents per bushel; carrots, 17 cents per bushel; beans, $1 50 per bushel; apples, $1 50 per barrel; peaches, $1 50 per bushel; butter, 20 cents per pound; cheese, 8 cents; beef, 6 cents; sheep, average value, $1 50 per head; average wool per fleece, 3 pounds; price, 25 cents per pound; mutton, 4 cents per pound; skins, 50 cents a piece; hogs, 2 to a family; average weight, 300 pounds; live weight, 4 to 5 cents; pork, 8 cents per pound; fowls, 20 to a family, 25 cents each; eggs, 17 cents per dozen; honey, average per hive, 30 pounds, 30 cents per pound.

Cheshire county.—Beets, 25 cents; carrots, 20 cents; turnips, 25 cents; peas, $1; beans, $1 25; apples, 50 cents; butter, 20 cents per pound; cheese, 8 to 10 cents per pound; beef, 5 cents; skins, $4 per 100 pounds; wool, 2½ pounds per sheep; skins, 50 cents a piece; hogs, average number to a family, 2; average weight, 250 pounds; fowls, average to a family, 6; price, 12½ cents; average number of eggs per season, 20 dozen; 12½ cents per dozen; honey, 40 pounds per hive; price, 20 cents per pound.

Vermont.

Windsor county.—Average weight of fleeces, 3 pounds per head.

Hyde Park, Lamoille county.—Beets, 17 cents per bushel; carrots, 34 cents; turnips, 20 cents; peas, $1; beans, $1; Swedish turnips, 400 bushels to the acre; apples, 12 to 25 cents; butter, 10 to 20 cents; cheese, 6 to 8 cents; beef, 5 cents; skins, 4½ cents; average wool to a fleece, 2 to 4 pounds; price, 20 to 30 cents; mutton, price 3 to 4 cents; skins, 6 to 8 cents each; hogs, 2 to 6 average to a family; average weight, 100 to 600 pounds; price, live weight, 3 cents; of pork, 5 to 6 cents; fowls, average to a family, 6 to 10; price, each 17 cents; eggs, price per dozen, 12½ cents; honey, average per hive, 30 pounds; price, 12½ cents.

Franklin county.—Peas, 75 cents per bushel; beans, 83 cents; apples, 15 to 50 cents per bushel; butter, 12½ to 15 cents per pound; cheese, 6 to 6¼ cents; wool, average per fleece, 2½; price, 23 cents to 30 cents; mutton, 2 cents; skins, 30 to 50 cents each; pork, 5½ cents per pound.

Rutland county.—Peas, 75 cents per bushel; beans, 75 cents; butter, 15 cents per pound; cheese, 7 cents per pound; beef, 4 to 5 cents per pound; wool, 3 to 4 pounds per fleece; average, 3½ pounds; price, 25 to 30 cents; mutton, 4 cents; skins, 50 cents apiece; pork, 5 cents per pound, for the best; eggs, 10 cents per dozen.

Massachusetts.

Bristol county.—Beets, 25 cents per bushel; carrots, 20 cents; apples, 40 cents; peaches, $1 to $2; strawberries, 25 cents per quart; butter, 25 cents per pound; cheese, 10 cents; fowls, 50 cents; eggs, 17 cents per dozen.

Essex county.—Beets, 16 to 18 cents per bushel; carrots, 18 to 20 cents; turnips, 16 to 18 cents; beans, $1 50 to $2; apples, 75 cents to $1 per bushel; butter, 20 to 25 cents per pound; cheese, 8 to 10 cents; beef, 5 to 6 cents; skins, 4½ cents; mutton, 4 to 5 cents; hogs, live weight, 5 to 6 cents per pound; pork, 6 to 7 cents; fowls, average for a family, 20 to 30; price, 17 to 20 cents each; eggs, 12 to 20 cents per dozen; honey, 17 to 20 cents per pound.

New York.

St. Lawrence county.—Butter, 14 cents per pound; cheese, 5½ cents per pound; avails of a cow, $20 per head for the season. Horses, from fifty to one hundred and fifty dollars per head; neat cattle, two years old, thirteen dollars per head; after dairy, in the fall, cows worth from twelve to fifteen dollars per head—in the spring, from eighteen to twenty-five dollars per head. Working oxen, fifty to one hundred dollars per yoke; sheep, after shearing, in summer, one dollar per head; price of live hogs, three cents per pound; average price of fresh pork, five cents per pound.

Yates county.—Apples, 30 cents, peaches 50 cents; butter, 15

cents; cheese, 7 cents; horses $75; beef, 4 cents per pound; wool, 22 cents per pound; mutton, 3 cents per pound; skins, 37½ cents apiece.

Erie county.—Beets, 25 cents per bushel; carrots, 16 cents; turnips, 25 cents; peas, 50 cents; beans, $1; apples, 25 to 50 cents; peaches, $1 50 per bushel. Butter, 12 to 15 cents per pound; cheese, 5 to 7 cents per ponnd; wool, average per sheep 2½ pounds—price, 25 to 32 cents; beef, 3½ to 4 cents per pound—skins, 3½ cents per pound, green; mutton, 2½ cents per pound—skins, 50 cents apiece. Hogs, average weight 200, live weight 270—price per pound, live weight, 3 cents; pork, 5 cents. Fowls, 12½ cents each; eggs, 10 cents per dozen; honey, 10 cents per pound.

Suffolk county, L. I.—Root crops, 200 bushels to an acre: beets, 25 cents; carrots, 38 cents; turnips, 25 cents; peas, 50 cents; beans, 75 cents. Apples, 38 cents; peaches, $1 50 per bushel; butter, 14 to 18 cents per pound; cheese, 5 to 8 cents per pound; horses, average value $66; butter, 24 cents; beef, 5 to 9 cents—skins, 3 to 4½ cents per pound; mutton, 6 cents per pound—skins, 18 to 25 cents apiece; hogs, average weight, 200 pounds—price of live weight, 5 cents; pork, 5 to 8 cents per pound. Fowls, 38 cents a pair; eggs, 12½ cents per dozen.

Niagara county.—Beets, 16 to 24 tons per acre, 12½ cents per bushel; carrots, 800 to 1,100 bushels per acre, 18 cents per bushel; peas, 50 cents; beans, 75 cents; apples, 25 cents; peaches, 75 cents to $3 per bushel; strawberries, 12½ cents per quart; grapes, 10 cents per pound; butter, 10 to 25 cents; cheese, 7 cents per pound; beef, 3½ to 5 cents—skins, 3 to 5 cents per pound; sheep, 75 cents to $3 per head; wool, 3 pounds per head, average at 22 to 28 cents; mutton, 2 to 4 cents per pound—skins, 50 cents apiece; hogs, average six to a family—price per pound, live weight, 2½ to 3 cents; pork, 3½ to 4 cents. Fowls, 12½ cents each; eggs, 6¼ to 18¾ cents per dozen; honey, 20 pounds average per hive, 12½ cents per pound.

Monroe county.—Peas, 62 cents per bushel; turnips, 25 cents per bushel; apples, 25 cents; peaches, from 25 cents to $2 50 per bushel; butter 12½ cents; cheese, 6 cents per pound; beef, 3 to 4 cents—skins, 3 to 4 cents per pound; sheep, 3½ pounds wool per sheep, price per pound, 28 cents; mutton, 2 to 3 cents—skins, 25 cents to 75 cents a piece; hogs, average four to a family, average weight 275 pounds, neat—pork, 4½ cents; fowls, average ten to a family, 25 cents each; eggs, average forty per season, 10 cents per dozen; honey, 12 pounds per hive, at 15 cents per pound.

Sullivan county.—Turnips, 25 cents per bushel; apples, 37½ to 50 cents; butter 18¾ to 20 cents per pound; hogs, 20.3 to a family, average weight 200 to 250 pounds, 4 to 5 cents, live weight; pork, 6 cents per pound, fowls, 25 cents each; eggs, 10 to 12½ cents per dozen; honey, average per hive 60 pounds, price 10 to 12½ cents.

Madison county.—Peas, about as corn, 50 to 75 cents per bushel. Average of butter per cow, 125 pounds—of cheese, 350 pounds; wool, average per fleece 3 pounds, price 24 to 35 cents; hogs, aver-

age weight fattened 275 pounds, $4 50 per cwt. for such as weigh 300 pounds—under 300, less price; honey, 12½ cents per pound.

Orleans county.—Apples, 25 cents per bushel; butter, 12½ cents per pound; cheese, 7 cents per pound; beef, 6 cents per pound.

New Jersey.

Camden county.—Apples, 25 to 30 cents; beets, 20 cents per bushel; carrots, 20 cents; turnips, 20 cents; peas, early in pod, $1 per bushel; butter, 18¾ to 25 cents; beans, $1; broom corn, $20 per ton; strawberries, 10 cents per quart; grapes, 12½ cents per pound; cheese, 10 cents; horses, $50 to $100; cattle, $20 to $25; beef, 6 cents per pound—skins, 4 cents per pound; sheep, average wool 2½, price 23 cents per pound; mutton, 5 cents per pound—skins, 50 cents apiece; hogs, $5 or $6, average weight 250 pounds; pork, by the hog, 5 cents per pound—average six to a family; pork per pound 6 cents, of 200 pounds pork; salted, 7 to 8 cents per pound; fowls, 25 to 37½ cents each; eggs, 12½ cents per dozen. Fowls, thirty to a family, 60 cents per pair; eggs, 45 per season each hen; honey, 25 cents per pound—average per hive 40 pounds, 16 cents per pound. Root crops, 300 bushels arable product; pod fruits, 10 bushels per acre.

Mercer county.—Apples, 25 cents per bushel; peaches, 25 cents; butter, 20 cents per pound; sheep, average of wool to fleece 2½ pounds, price 25 cents per pound; mutton, 6 cents per pound; hogs, average two to a family, average weight 200 pounds; pork, 5¾ cents per pound; fowls, average of ten to a family, price 37½ cents a pair; eggs, 12½ cents per dozen.

Monmouth county.—Turnips, 6 cents, for feed—white, 10 cents; Russia, 25 to 30 cents, in market. Beans, $1 25, net sales; apples, 50 cents, for late kinds; strawberries, 15 cents, net sales; beef, 5 cents; pork, 6 cents; eggs, 12½ cents; skins, 4 cents per pound, green; peaches, 37½ cents per basket, (three pecks)—50 cents per bushel.

Pennsylvania.

Philadelphia county.—Carrots, 50 cents per bushel; apples, 30 cents; strawberries, 25 cents per quart; grapes, from 12½ to 62½ cents per pound; butter, 25 cents.

Dauphin county.—Turnips, 20 cents per bushel; peaches, 25 cents; apples, 12½; strawberries, 20 cents per quart; butter, 12½ cents per pound; cheese, 8 cents; horses, average value, $35; cattle, average value, $10; beef, 5 cents per pound; skins, 5 cents per pound; wool, average per sheep, 3½ pounds—price 28 cents; mutton, 5 cents per pound; skins, 50 cents apiece; hogs, 6½ to a family, average weight, 120 pounds; pork, 5 cents per pound; fowls, average 25 to a family, price 12½ cents apiece; eggs, 9 cents per dozen; honey, average per hive, 18 pounds, price 20 cents.

Delaware county.—Beets, $1 per bushel; carrots, 50 cents; turnips, 20 cents to 25 cents; peas, $1 50 per bushel; Lima beans,

cents per quart; beans, $1 50 cents per bushel; broom corn, 200 to 300 acres cultivated; brush, worth $20 per acre; apples, 20 to 37½ cents per bushel; peaches, 45 to 50 cents; strawberries, 10 to 25 cents per quart; raspberries, 4 to 12 cents per quart; grapes, from 2 to 12½ cents per pound; butter 16 to 40 cents, 25 average per pound; cattle, $20; beef, average 4 to 5 and 6 cents per pound; skins, 3 cents per pound—$3 to $4; mutton, 5 cents—4 to 5 cents; wool, average per sheep, 50 pounds—25 cents per pound; hogs, about 1½ to 3 to a family, average 200 to 250 pounds; pork, 6 to 7 cents; poultry, 80,000 permanent stock—13 to a family—25 cents each; eggs, 6 dozen per hen—3 chickens per hen, at 25 cents each; average price of eggs, 15 cents per dozen—12½ cents.

Adams county.—Apples, 12½ cents; butter, 16 cents; hogs, 5 to a family, whole value $40—average weight, 75 pounds; fowls, 20 to a family, at 16 cents apiece; eggs, 12½ cents per dozen.

Lancaster county.—Apples, 20 to 25 cents per bushel; butter, 12 to 16 cents; cheese, 6 to 8 cents; beef, 5 to 8 cents; skins, 4 per pound, green; value of sheep, $1 to $3; wool, 3 to 4 pounds per sheep—price 20 to 30 cents per pound; mutton, 5 to 6 cents; skins, 25 to 40 cents apiece; hogs, live weight, 3 to 4 cents per pound; pork, 5½ to 6 cents per pound; fowls, 50 or 60 per family—price 25 to 30 cents a pair; eggs, 12 to 15 cents per dozen; honey, average of hives, 10 to 12 pounds, and leave for bees for winter; comb honey, 18 to 20 cents per pound.

Fayette county.—Beets, 50 cents per bushel; turnips, 25 cents; peas, 75 cents in pod, $1 per bushel; apples, 25 cents per bushel; peaches, dried, $1 25 to $1 50 per bushel; butter, 10 to 15 cents per pound; cheese, 6¼ cents per pound; horses, $50 to $100, average; beef, 4 cents per pound; skins, 3½ to 4 cents per pound; sheep, value, average, $1; wool, per fleece, 2½ lbs.—25 cents per pound; mutton, 4 cents per pound; skins, 12½ cents per piece; pork, 3 to 3½ cents per pound; eggs, 6½ cents per dozen; hog, average, about 180 pounds—price, live weight, $2 50 to $2 62½ per 100; honey, 25 pounds per hive—12½ to 15 cents per pound.

Wayne county.—Rutabagas, 31 cents per bushel—average crop, 800 bushels, sometimes 1,200 or 1,300 bushels per acre; peas, 25 to 30 bushels per acre—price, $1 per bushel; apples, 50 cents per bushel; butter, 18 to 22 cents per bushel; cheese, 8 to 10 cents per pound; beef, the quarters, $5 to $6; hides, 3½ to 4 cents per pound; cows, $30 to $35 apiece; oxen, $95 to $120 per yoke; wool, average fleece, 3½ to 4 pounds; wool, 20 to 50 cents per pound; mutton, in spring, 5 to 6 cents—in the fall, 4 to 5 cents per pound; skins, 37 to 62½ cents apiece; average weight fatted hogs, 270 pounds—price for market, $6 to $7 per cwt.; eggs 12½ cents per dozen; average honey per hive, 45 pounds—price, 12½ cents.

Franklin county.—Apples, 40 cents per bushel; peaches, 50 to 75 cents; butter, 12½ cents; beef, 4½ cents; skins, 4 cents per pound; wool, average per fleece, 3½ pounds—price, 25 to 30 cents per pound; mutton, 4 cents per pound; skins, 37½ cents per pound; hogs to a family 3, worth $25, average $1 75; pork, 4 to 4½ cents per pound; fowls, per family 18, 12½ cents each; eggs, 10 cents per dozen; honey, 12½ cents per pound.

Maryland.

Prince George.—Apples, 25 cents; hogs to a family 4, valued at \$10—average weight, 100—price, 5 cents per pound; average number of fowls to a family, 8—price, $12\frac{1}{2}$ cents each; average number of eggs to each per season, 12—price, 10 cents per dozen.

Virginia.

Princess Ann county.—Cow, net 300 pounds—value, \$15; steer, 600 pounds weight, \$30; beans and black eye peas, \$1 per bushel; common cornfield peas, 55 cents per bushel; apples, 25 cents per bushel; peaches, 50 cents; vinegar, 25 cents per gallon; brandy, 50 to 63 cents per gallon; strawberries, $12\frac{1}{2}$ to $18\frac{3}{4}$ cents per quart; 2,000 or 3,000 pounds of *butter* sent to market—value, 25 to $37\frac{1}{2}$ cents per pound; horses, about 1,800, at \$75; cattle, average value \$8; beef, 5 cents per pound; skins, 4 cents per pound; *sheep*, estimated 2,500—average value, \$2 25—average weight, 80 pounds—average quantity of wool of each, 3 pounds—price of wool, 25 cents per pound; mutton, 3 cents per pound; skins, 31 to 38 cents each; hogs to a family estimated 10—average live weight, 150 pounds—average dead weight, 100 pounds—price of fresh pork, 5 cents per pound; average number of fowls to a family, 30; old geese, 6; old turkeys, 6; old ducks, 6; average raised annually from old stock, 160 chickens, 20 turkeys, 20 geese, 30 ducks—price: young chickens, \$2 per dozen—grown fowls, 50 to 75 cents per pair—ducks, 50 cents per pair—geese, 75 cents per pair—turkeys, 75 cents to \$1 each; eggs, $12\frac{1}{2}$ to $16\frac{2}{3}$ cents per dozen; honey, \$1 per gallon.

Buckingham county.—Average of wool per sheep, $2\frac{1}{2}$ pounds—price, 35 cents; average number hogs to a family, 20—value each, \$2—average weight, 130 pounds; price of pork, 5 cents per pound; average number fowls to a family, 20—price, 15 cents each; eggs, average per family per season, 500—price, per dozen, 8 cents; honey, average pounds per hive, 8—price, 25 cents.

Mononghalia county.—Price of turnips, $16\frac{3}{4}$ cents per bushel; apples, 25 cents; peaches, $37\frac{1}{2}$ cents; strawberries, 6 cents per quart; butter, 10 cents per pound; cheese, $8\frac{1}{3}$ cents; cattle, live weight, $1\frac{1}{2}$ cents per pound; beef, 3 cents; skins, 4 cents; sheep, average value, \$1 25; average wool to a fleece, $2\frac{1}{2}$ pounds—price, 30 cents; mutton, $16\frac{2}{3}$ cents; skins, 25 cents apiece; hogs to a family,—value each, \$5—average weight, 175 pounds, live weight—price, $2\frac{1}{2}$ cents; pork, $3\frac{1}{4}$ cents per pound; fowls, 20 to a family, at 10 cents per head; eggs, from 10 to 50 each, at $6\frac{1}{4}$ cents per dozen; honey, 8 pounds average per hive—price, 10 cents.

Brooke and Ohio counties.—Beets, 25 cents per bushel; carrots, 25 cents; turnips, 20 cents; apples, 25 to 40 cents; peaches, 25 to 75 cents; strawberries, $18\frac{3}{4}$ cents per quart; butter, 10 to 12 cents; cheese, 7 cents; beef, $3\frac{1}{4}$ to 4 cents; skins, 3 to 4 cents per pound; horses, value, \$55, average; sheep, average per head, \$1 50—average pounds of wool, $2\frac{1}{4}$ to $2\frac{1}{2}$ pounds—price, 20 to 30 cents; mut-

ton, 3 cents per pound; skins, 20 cents apiece; hogs, 4 to 8 to a family—average value, \$3 to \$5 50—average weight, 175 pounds—live weight, 225—price, live weight, $2\frac{1}{2}$ cents per pound; pork, 3 cents to $3\frac{1}{4}$ per pound; fowls, 20 to a family, average 8 to 10 cents apiece; eggs, 7 to 8 cents per dozen.

South Carolina.

Newberry district.—Beets, 40 cents per bushel; carrots, 20 cents; turnips, 20 cents; apples, 25 cents; peaches, 25 cents; butter, $12\frac{1}{2}$ cents—52,000 pounds; mules and horses, 6,000—valued at \$300,000; cattle, 20,000—valued at \$100,000; beef, 3 to 4 cents per pound; skins, dry, 9 cents per pound; hogs, 40,000 head—4 to a family, at \$80,000—average weight, 100—2 cents per pound, average weight, and for pork, 4 cents per pound; fowls, 25,000; eggs, per dozen, $12\frac{1}{2}$ cents; honey, 500 hives, averaging 8 lbs., at $12\frac{1}{2}$ cents per lb.

Upper South Carolina.—Butter, $12\frac{1}{2}$ cents per pound; 1 hog to each person—value, \$7—150 to 160 pounds, average weight—4 to 5 cents per pound, net weight.

Charleston county.—Cow peas, 70 to 80 cents per bushel; butter, 25 cents per pound; beef, 5 cents; skins, 10 cents per pound; price of pork, 4 cents per pound; eggs, $12\frac{1}{2}$ cents per dozen.

Georgia.

Walker county.—Beets, 50 cents per bushel; peas, 30 cents; apples, 50 cents per bushel; butter, 8 to 10 cents; horses, \$40, average; cattle, average value, \$8; beef, $2\frac{1}{2}$ cents per pound; skins, 5 cents per pound, green; wool, average per sheep, $1\frac{1}{2}$ pounds—price, 25 cents; poultry, 5 to a family—price, 5 cents apiece; eggs, per dozen, 5 cents; honey, average, 15 pounds per hive—price, 8 cents per pound.

Cass county.—Turnips, 100 to 200 bushels per acre, at 25 cents per bushel; peas, 10 bushels per acre, at 50 cents per bushel; beef, 2 to 3 cents per pound; skins, green, 5 cents per pound—dry, 10 cents per pound; wool, average per sheep, $2\frac{1}{2}$ pounds—price, 25 cents per pound; mutton, 4 cents per pound; skins, 50 cents to \$1 apiece; hogs, 25 to a family, at \$2 to \$2 50 each—average weight, 100 pounds; pork, $2\frac{1}{2}$ to 3 cents per pound.

Alabama.

Barbour county.—Peas, average 10 bushels per acre, 75 cents per bushel; horses, \$50 to \$100; beef, $2\frac{1}{2}$ to $3\frac{1}{2}$ cents; skins, 6 to 8 cents; sheep, average 2 lbs. wool, at $37\frac{1}{2}$ cents per pound, value \$1 50 to \$2 apiece; hogs, average weight 125 lbs.; pork, $3\frac{1}{2}$ to 4 cents; bacon, 6 cents; fowls, 10 cents a piece; eggs, 10 cents per dozen; honey, grows or stands, average 7 to 8 lbs., at 25 cents per pound.

Jackson county.—Cattle, \$10 to \$20; beef, $2\frac{1}{2}$ cents per pound; skins, $12\frac{1}{2}$ cents, dry; sheep, \$1 25 each; wool, 2 to $2\frac{1}{2}$ lbs. average, at 30 cents per pound; mutton, $3\frac{1}{2}$ cents; skins, \$1 50 apiece; average weight of hogs, 200 to 250 lbs.; pork, $2\frac{1}{2}$ cents per pound.

Mississippi.

Copiah county.—Wool, 4 lbs. average to a sheep, 25 cents per pound; beef, $3\frac{1}{2}$ cents per pound; skins, 9 cents per pound; mutton, 5 cents per pound; skins, \$1 apiece; hogs, average weight 200 lbs., price 4 cents per pound.

Tennessee.

Pikeville, Bledsoe county.—50,000 bushels root crops, average 75 bushels per acre; beets, 2,000 bushels, at 50 cents; turnips, 50,000, at 20 cents; pod fruits, 200,000 bushels; peas, 50 cents; beans, 50 cents; broom corn, \$2 per ton; 50,000 bushels apples, 25 cents per bushel; peaches, 30,000 bushels, 25 cents per bushel; strawberries, 10 cents per quart; grapes, 10 cents per pound; butter, 3,000 lbs., at $8\frac{1}{3}$ cents; cheese, 2,000 lbs., at 10 cents per pound; horses, 1,600, at \$50; cattle, 3,200, at \$4; beef, 1,200, at $2\frac{1}{2}$ cents; skins, 2,000, at 15 cents per pound; sheep, 6,000; wool, 12,000 lbs., average 2 lbs., 25 cents per pound; mutton, $2\frac{1}{2}$ cents per pound; skins, 25 cents apiece; fowls, 120,000, or 20 per family, 5 cents apiece; eggs, 60,000 dozen, at 5 cents per dozen; honey, 3,000 lbs., average 15 lbs. per hive, at 10 cents per pound.

Smith county.—Apples, 50 cents per bushel; butter, 10 cents per pound; skins of cattle when dry, 10 cents; sheep, value 25 cents per head, $2\frac{1}{2}$ lbs. wool; 10 hogs to a family of six persons, valued at \$36, average 200, or live weight 240, at 2 cents per pound; fowls, 8 cents; eggs, 5 cents per dozen.

Sheddyville, East Tennessee.—Strawberries, 25 cents per quart; wool, $1\frac{1}{2}$ lbs. per sheep, price 20 cents; hogs, 200 lbs. net, live weight, at $2\frac{1}{2}$ cents per pound.

Kentucky.

Greenup county.—Root crops, 75 bushels to the acre; beets, 25 cents per bushel; carrots, 50 cents; turnips, $12\frac{1}{2}$ cents; peas, 75 cents; beans, 75 cents; apples, 25 cents; strawberries, $12\frac{1}{2}$ cents per quart; butter, $12\frac{1}{2}$ cents per pound; cheese, 8 cents; 2,800 horses, \$50 each; 6,000 cattle, average at \$10; beef, 3 cents per pound; skins, green, 4 cents per pound; sheep, 8,000, average \$1, average wool 3 lbs. per sheep, 25 cents per pound; mutton, $3\frac{1}{2}$ to 4 cents per pound; skins, 25 cents each; hogs, 8,000, eight to a family, average weight 165 lbs., live weight 200 lbs., at 2 cents per pound; pork, $2\frac{1}{2}$ to 3 cents; fowls, 25 to a family, 18 cents apiece; average eggs, 6 cents per dozen; bees, average of hive, 30 lbs., at 10 cents per pound.

Ohio.

Highland county.—Average per acre of root crops 100 bushels; beets, 10 cents; turnips, 20 cents; peas, 50 to 75 cents per bushel; beans, 75 cents to \$1; apples, 10 to 20 cents; strawberries, 10 cents per quart; peaches, 30 cents per bushel; butter, 10 to 12 cents per

pound; cheese, 6 to 8 cents; horses, \$50 to \$100; cattle, \$10 to \$20; beef, $3\frac{1}{2}$ cents per pound; skins, 25 cents; sheep, 2 lbs. of wool, average price 20 to 25 cents; hogs, 10 head to a family, \$4 per head, average weight 200 lbs.; price of pork, \$3 per cwt.; fowls, average to a family 3, 10 cents each; eggs, average per season 20 dozen; hives, average pounds each, 30, price 10 cents per pound.

Defiance county.—Horses, average value, \$40; cattle, average value, \$10; beef, 3 cents per pound; skins, 3 cents per pound, green; sheep, value per head, \$1; wool, 3 lbs. to a sheep, average price 25 cents; mutton, 4 cents; skins, 25 cents each; hogs, 8 or 10 to a family, value average \$1 50, average weight 100 lbs., price live weight $1\frac{1}{2}$ cents per pound; pork, 3 cents per pound.

Richland county.—Turnips, $12\frac{1}{2}$ cents per bushel; peas, 50 cents; beans, 75 cents; apples, $12\frac{1}{2}$ cents; cider per barrel, \$1; peaches, $12\frac{1}{2}$ cents; strawberries, 10 cents per quart; grapes, $6\frac{1}{4}$ cents per pound; butter, 10 cents; cheese, 5 cents; horses, best, \$100; cattle, average 3 years old, \$10; beef, 3 cents; sheep, average \$1 per head; wool, average per head 3 lbs., price 18 to 31 cents; hogs, 6 to a family, valued at \$27, average weight each 150 lbs.; price live weight \$4 50 per cwt.; pork, 3 cents per pound; fowls, average per family 40, price $6\frac{1}{4}$ cents each; eggs, 5 cents per dozen; honey, average per hive 50 lbs., price 10 cents per pound.

Richland (again.)—Apples, 20 cents; butter, 10 cents; cheese, 7 cents; beef, 3 cents; skins, 4 cents per lb.; sheep, 75 cents a head; $3\frac{1}{2}$ lbs. per head of wool, 25 cents per lb.; mutton, 2 cents; hogs, 4 to a family, average weight 200, live weight $2\frac{1}{2}$ cents per pound; fowls, 20 to a family, $12\frac{1}{2}$ cents each; eggs, 8 cents per dozen.

Licking county.—Broom corn about \$40 per ton, three acres will yield one ton; apples, 30 cents per bushel; butter, 10 cents per pound; cheese, 6 cents per pound; beef, 3 to 4 cents per pound; skins, 4 cents per pound; hogs, 5 to a family, average value \$3 apiece, average weight 150 lbs., or 200 lbs. live weight; price live weight 2 cents per pound; pork, 3 cents per pound.

Morgan county.—Apples, 25 cents per bushel; peaches, 25 cents per bushel; butter, 6 to 10 cents per pound; cheese, 6 to 7 cents; beef, \$2 50 per cwt.; skins, 5 cents per pound; wool, average to a sheep $2\frac{1}{2}$ lbs., price 30 to 50 cents per pound; hogs, average weight 175 lbs., price $2\frac{1}{2}$ cents, live weight, per pound; pork, 2 to 3 cents per pound; fowls, 6 to 12 cents each; eggs, 3 to 10 cents per dozen; honey, 10 to 12 cents per pound.

Wayne county.—Turnips, 25 cents per bushel; beans, $62\frac{1}{2}$ cents; apples, 20 cents; peaches, 20 cents; beef, 3 cents; skins, $3\frac{1}{2}$ cents per pound; average wool per sheep 3 lbs., price 20 cents; skins, 25 cents apiece; average of hogs 210, live weight 260, price live weight 2 cents per pound; pork, $2\frac{1}{2}$ cents per pound; fowls, average 50 per family, at $8\frac{1}{3}$ cents each; eggs, $6\frac{1}{4}$ cents per dozen; price of honey, $12\frac{1}{2}$ cents.

Tuscarawas county.—Apples, 50 to 75 cents, dried; peaches, \$1 per bushel, dried; butter, $12\frac{1}{2}$ cents per pound; cheese, 7 cents per pound; average value of cattle, \$10 to \$18 per head; beef, 3

cents per pound; skins, $4\frac{1}{2}$ cents per pound; average value of shee per head, \$1 to \$1 25; wool, average to a fleece $3\frac{1}{2}$ lbs., price to 33 cents; mutton, 4 cents per pound; skins, 6 cents per pound.

Delaware county.—Turnips, 12 cents per bushel; beans, one dollar; apples, 10 cents; peaches, 20 cents; butter, 10 cents; cheese, 5 cents; number of horses 375, average value \$40; cattle, 1,150, value \$8; beef, 3 cents per pound; skins, 4 cents per pound; sheep, \$1; wool, $3\frac{1}{2}$ lbs. per sheep, at 25 cents per pound; mutton, 3 cents; hogs, 12 to a family, value $1\frac{3}{4}$ cents per pound, average weight 100 lbs; pork, \$2 75 per 100; eggs, 6 cents per dozen; honey, average per hive 30 lbs., price 10 cents.

Indiana.

Princeton county.—Butter, 8 cents per pound; three pounds of wool per sheep, 20 cents per pound; hogs, 10 to a family, valued at \$1 to \$2 apiece.

Wayne county.—Apples, 12 to 20 cents per bushel; butter, 10 cents; cheese, 8 to 12 cents; horses, \$40 to \$80; cattle, \$8 to \$15; skins, $3\frac{1}{2}$ cents, green; 7 cents for green calf; sheep, 50 cents per head; when sheared, $3\frac{1}{2}$ pounds per sheep, unwashed; skins, \$3 per dozen, green; pork, 2 cents per pound, live weight; average 250 pounds; fowls, 70 to a family, 8 cents apiece; eggs, 5 cents per dozen, 240 to a family.

Wabash county.—Hogs, average weight, 150 to 200 pounds; price per pound, live weight, $2\frac{1}{4}$ to $2\frac{1}{2}$ cents.

Orange county.—Peas, 75 cents per bushel; beans, 50 cents; apples, $37\frac{1}{2}$ cents; peaches, \$1 50; butter, $8\frac{1}{3}$ cents per pound; horses, average value, \$40; cattle, \$10; beef, 3 cents per pound; sheep, average value, \$1 per head; average of wool, $2\frac{1}{2}$ pounds, price 25 cents per pound; mutton, $2\frac{1}{2}$ cents; skins, 25 cents apiece; hogs average \$2, average weight, 200 pounds, live weight, 2 cents per pound; pork, $2\frac{1}{2}$ cents per pound; fowls, 3 dozen in a family, 75 cents per dozen; eggs average 10 cents per dozen; honey, average of hive 20 pounds, at 10 cents per pound.

Laporte county.—Beans, \$1 per bushel; winter apples, \$1 per bushel; peaches, 25 cents per bushel; butter, $12\frac{1}{2}$ cents; cheese 10 cents; horses, good, \$75; cattle, oxen, \$65; cows, \$12; beef, 4 to 5 cents per pound; skins, 3 cents per pound; sheep, \$1 per head; wool, 20 to 25 cents per pound, 3 pounds per sheep; mutton, 3 to 5 cents; hogs, 10 to 15 to a family, 200 to 250 pounds average weight; pork, 2 cents to $2\frac{1}{2}$ per pound; fowls, from 50 to 100 to a family, $12\frac{1}{2}$ cents each; eggs, 50 each per season, 8 to $12\frac{1}{2}$ cents per dozen; honey, 75 pounds average of hive, 15 to 16 cents per pound.

Marion county.—Apples, 18 cents per bushel; peaches, 50 cents per bushel; butter, $12\frac{1}{2}$ cents per pound; cheese, 8 cents per pound; beef, $2\frac{1}{2}$ cents per pound; skins, $3\frac{1}{3}$ cents per pound; horses, \$45, average; cattle, \$9; sheep, $2\frac{1}{2}$ pounds of wool apiece, price 25 cents per pound; mutton, $2\frac{1}{2}$ cents per pound; skins, $12\frac{1}{2}$ cents apiece; hogs, 20 to a family; average weight 200 pounds, live

weight; \$1 75 per 100 pounds—$2\frac{1}{2}$ cents per pound; fowls, 50 per family, 8 cents per head; eggs, per family, 150 dozens per year, price 6 cents per dozen; honey, 30 pounds average per hive, price 10 cents per pound.

Bartholomew county.—Apples, 10 cents per bushel; strawberries, 10 cents per quart; butter $12\frac{1}{2}$ cents per pound; cheese, 7 cents; beef, $2\frac{1}{2}$ cents; skins, 4 cents, green; sheep, average value per head, \$1; $3\frac{1}{2}$ pounds of wool each, price 25 cents per pound; mutton, 3 cents; skins, 25 cents apiece; hogs, 10 to a family, average value \$4 50, average weight, 225 pounds; price, live weight, 25 cents per pound; pork, $2\frac{1}{2}$ cents; fowls, \$1 per dozen.

Noble county.—Turnips, $12\frac{1}{2}$ cents per bushel; beans, \$1; broom corn, \$2 50; apples, \$1; peaches, 25 cents; strawberries, 3 cents per quart; grapes, 25 cents per pound; butter, 10 cents; cheese, 6 cents; horses, \$60; cattle, \$13; beef, $2\frac{1}{2}$ cents per pound; skins, 3 cents per pound; wool, 25 cents per pound; mutton, 3 cents; skins, 25 cents; hogs, 3 per family, value \$11, average weight 150 pounds, live weight 180 pounds; price 2 cents per pound; pork $2\frac{1}{2}$ cents per pound; fowls, 10 average per family, price 10 cents; eggs, 8 cents per dozen; honey, average per hive, 60 pounds, price 8 cents.

White county.—Apples, 50 cents; peaches $62\frac{1}{2}$; butter, 10 cents; cheese, 6 cents; cows, \$8; steers, 3 years old, \$9; beef $2\frac{1}{2}$ cents; skins, 3 cents green; dry, 6 cents; wool, $3\frac{1}{2}$ pounds per sheep; skins, 30 cents; hogs, 8 to a family, price, \$6 each; average weight, 200 pounds, live weight 240, price 3 cents; pork, 3 cents for best; fowls, 50 to a family; price $6\frac{1}{2}$ cents each; eggs, 5 cents per dozen; honey, 8 cents per pound.

Greene county.—Beets, 25 cents; carrots, $37\frac{1}{2}$ cents; turnips, $12\frac{1}{2}$ cents; beans, $62\frac{1}{2}$ cents; apples, 20 cents per bushel; butter, 10 cents; cheese, 10 cents; beef, $2\frac{1}{4}$ cents; skins, 8 cents, dry; sheep, \$1 per head; wool, 3 pounds per head—price, 15 to 20 cents; mutton, 2 cents; skins, 50 cents; hogs, average weight 200 pounds; live weight, $1\frac{3}{4}$ cents per pound; pork $2\frac{1}{2}$ cents; honey, 6 cents per pound.

Illinois.

Putnam county.—Root crops, 150 bushels, average arable produce; beets, 25 cents per bushel; carrots, 20 cents; turnips, 10 cents; peas, 75 cents; beans, 75 cents; apples, 50 cents; peaches, 40 cents; strawberries, 8 cents per quart; butter, 10 cents per pound; cheese, 8 cents; horses, average, \$40; cattle, \$8; beef, $2\frac{1}{2}$ live weight; skins, 3 to 6 cents per pound; average of wool to a sheep, 3 pounds—price, 20 cents per pound; mutton, 3 cents per pound; skins, 25 cents each; hogs, average 25 to a family, value, \$1 50 per head; average weight, 100 pounds—live weight, 2 cents per pound; pork, $2\frac{1}{4}$ to $2\frac{1}{2}$ cents per pound; fowls, 25 to a family, $6\frac{1}{4}$ to 8 cents each; eggs, 4 to 5 cents per dozen; honey, average 100 pounds to a hive—price, 8 cents per pound.

Jackson county.—Butter, 8 to $12\frac{1}{2}$ cents per pound; cheese, 8 to 10 cents; horses, \$25 to \$100; cattle, \$8 to \$15; beef, 2 cents, on foot—3 to 4 in market; skins, 7 to 8 cents per pound; wool, per

fleece, from 2½ to 3 pounds—price, 23 to 25 cents; mutton, 2½ to 4 cents in market; skins, 37½ to 62½ apiece; hogs, 35 to 40 to a family, valued at from $40 to $75—average weight, 120 to 130 pounds; pork, 2½ cents per pound; fowls, 30 to 200 to a family, valued at $1 to $2 per dozen; eggs, 20 to 40 dozens to a family, 10 cents per dozen; honey, 50 cents to $1 per gallon.

De Witt county.—Apples, 20 cents per bushel; peaches, 30 cents per bushel; butter, 10 cents; cheese, 8 cents; horses, average value, from $40 to $60; beef, 2½ cents per pound; skins, 3 cents; sheep, value 75 cents to $2 25; wool, per fleece, 3½ pounds—20 cents: mutton, 3 cents: hogs, 10 to a family, average weight, 250 pounds: live weight, per pound, 1½ cents: pork, 2 cents.

Randolph county—Apples, from 10 cents to $1 per bushel: peaches, from 5 to 50 cents per basket (3 pecks): horses $20 to $100: 2 year old steers, $8—4 years, $14: beef, from 2 to 2½ cents: skins, 3 to 6 cents per pound: wool, 2½ pounds per sheep—price, 15 to 30 cents per pound: mutton, 3 cents: skins, 15 cents apiece: hogs, average number to a family, 10—price, $40: average weight, 180 pounds—live weight price per pound, 2 cents: pork, 2½ cents: fowls, average number per family, 30—price, 12½ cents: eggs, 8 cents per dozen: honey, average number of pounds per hive, 40—price 10 cents per pound.

Union county.—Beets, 50 cents: carrots, 25 cents: turnips, 12½: peas, 50 to 60 cents: beans, 30 to 75 cents: apples, 12½ cents per bushel: peaches, 12½ cents: butter, 10 to 12 cents: horses, $25 to $30: cattle, $26 per head: beef, 2 to 2½ cents per pound: skins, 6 to 7 cents per pound: wool, 2 to 4 pounds per sheep—price, 15 to 25 cents per pound: mutton, 2 to 3 cents per pound: skins, 25 to 30 cents apiece: pork 2½ to 3 cents per pound: eggs, 5 cents per dozen.

Michigan.

Wayne county.—Apples, 25 cents per bushel; peaches, 37½ cents; butter, 12½ cents, (advance;) beef, 4 cents per lb.; skins, $3 per cwt.; wool, 22 cents per lb.; pork, 3 cents per lb.; fowls, 10 cents apiece; eggs, 8 cents per dozen; wood, $1 12½ per cord; lumber, $8 per man.

Oakland county.—Wool, 27½ lbs. average to sheep.

Hillsdale county.—Peas, 75 cents per bushel; butter, 10 cents per lb.; cheese, 6 cents; beef, 3 cents; skins, 3½ cents per lb.; wool, 3 lbs. average to sheep, 20 cents per lb.; mutton, 3 cents per lb.; skins, 40 cents apiece; hogs, three to a family; pork, 4 cents per lb.

Washtenaw county.—300 bushels average arable product. Beets, 200 bushels per acre, 38 cents per bushel; carrots, 300 bushels per acre, at 25 cents per bushel; turnips, 200 bushels per acre, at 20 cents; peas, 20 bushels per acre, at $1 per bushel; beans, $1 per bushel; apples, 50 cents; peaches, 25 cents; strawberries, 10 cents per quart; grapes, 10 cents per lb.; butter, 12½ cents; cheese, 6 cents; beef, 2½ cents; skins, 3 cents; wool, average 3 lbs. per

sheep, price 25 cents per lb.; mutton, $2\frac{1}{2}$ cents; skins, $37\frac{1}{2}$ cents each; hogs, 5 to a family, average weight 250 lbs., 2 cents per lb. live weight; pork, 3 cents; fowls, 20 to a family, price 19 cents each; eggs, dozen per hen, price 10 cents per dozen; honey, 50 lbs. per hive, 10 cents per lb.

Monroe county.—Wool, average per sheep, $2\frac{1}{2}$ lbs., 18 to 25 cents per lb.; mutton, $2\frac{1}{2}$ cents per lb.; skins, $37\frac{1}{2}$ cents apiece.

Iowa.

Henry county.—Butter, 10 cents; cheese, $6\frac{1}{4}$ cts. per lb.; horses, $50 per head; cattle, $12 per head; beef, 3 cents; skins, dry, 4 cents per lb.; sheep, worth $1 per head, average $2\frac{1}{2}$ to 3 lbs. wool to a sheep, at 28 cents per lb.; hogs, 15 to a family, value $75, average weight 250 lbs., $1\frac{1}{4}$ cents per lb.; pork, 2 cents per lb.; fowls, average to a family, 40, 75 cents per dozen; eggs, $6\frac{1}{4}$ cents per dozen; honey, 25 lbs. average to a hive, $6\frac{1}{2}$ cents per lb.

Iowa county.—Beans, 40 cents per bushel; turnips, 15 cents; apples, 50 to 75 cents; butter, 10 cents per lb.; cheese, 10 cents; horses, average value, $40 to $50; cattle, average value $10 to $15; beef, 2 cents per lb.; skins, green, 2 cents per lb.; sheep, average value $1 25; wool, average to fleece, $2\frac{1}{2}$ lbs., price, 16, 20 and 25 cents per lb.; mutton, 2 cents per lb.; hogs, average weight 200 lbs. live weight, $1 50 per 100 lbs.; pork $2 per 100 lbs.; eggs, 5 cents per dozen; honey, 8 cents per lb.

Van Buren county.—Turnips, 15 cents per bushel; beans 40 cents per bushel; apples, 50 to 75 cents per bushel; peaches, 50 to $1 per bushel; butter, 10 cents per lb.; cheese, 10 cents; horses, $40 to $50; cattle, $10 to $15; beef, 2 cents per lb.; skins, green, 2 cents; sheep, $1 25; wool, $2\frac{1}{2}$ lbs. per sheep, price 16, 20 and 25 cents per lb; mutton, 2 cents per lb.; hogs, average weight, 200 lbs. live weight, $1 50 per 100 lbs.; pork, 2 cents per lb.; eggs, 5 cents per dozen; honey, 8 cents per lb.

Burlington.—80,000 cattle, worth $10 per head, 20 per cent. more than in 1847; beef, $2 75 per cwt.; a large amount of pork is fatted at a loss of $6 50 per cwt.; it is worth $2 50 per cwt.; 40,000 sheep, worth $1 50, thrive well—full 10 per cent. more than in 1847; chickens, 12 cents; eggs, 7 cents per dozen.

Texas.

Grimes county.—Butter, on an advance, 5 to 10 cents per lb.; in summer, amount, 45,583; 20 to 25 cents in winter; cheese, on an advance, 10 cents per lb.; 1,483; good milch cows worth $5 to $8; beef, $1\frac{1}{2}$ cents per lb.; grown bullock, 500 to 800 lbs.; barren cow, 500 to 600 lbs.; pork, 3 cents; bacon, 6 cents per lb.

Jasper county.—Butter, $12\frac{1}{2}$ cents per lb.; cheese, 10 cents; cattle, average, $4; sheep, average, $3; hogs, average value, $1; wool, 5 cents per lb.; bee hive, average value, $2.

Robertson county.—Price of beef on foot, $1 25 to $1 50 per cwt.; cows, $6 to $8 per head; pork, $2 to $3 per 100 lbs.

WAGES OF LABOR.

Maine.

Piscataquis county.—Agricultural, $10 to $15 per month—average, $12 per month. Mechanics, $1 to $1 50 per day. Female domestics, $1 to $1 50 per week. Lumbermen, sometimes, $12 to $30 per month.

Waldo county.—Agricultural, $12 per month. Mechanics, $1 to $1 50 per day. Female domestics, $1 per week.

West Ripley.—Agricultural, $10 to $14 per month.

New Hampshire.

Sullivan county.—Agricultural laborers, $11 per month by the year, in July, $25 to $40 per month—average, $30 per month. Mechanics, $1 25 per day. Female domestics, $1 34 per week.

Cheshire county.—Agricultural laborers, $14 per month. Mechanics, $20 per month. Female domestics, $1 50 per week.

Rockingham county.—Agricultural laborers, 75 cents per dey. Mechanical, $1 per day. Domestic, 25 cents.

Vermont.

Hyde Park, Lamoille county.—6 months, summer, $12 to $14 per month. Females, $1 to $1 16 per week.

Rutland county.—Agricultural laborers, $12 per month through the summer. Mechanics, $20 to $25 per month.

Windsor county.—Agricultural laborers, $13 per month. Mechanics, $1 25 per day. Female domestics, $1 17 per week.

Franklin county.—Agricultural laborers, $10 to $14 per month, or 50 to 60 cents per day; in haying and harvest, 75 cents to $1 per day. Mechanics, $1 25 to $1 50, and boarded. Female domestics, $1 per week.

Massachusetts.

Bristol county.—Laborers $10 to $15 per month. Females, $4 to $6 per month.

Essex county.—Agricultural laborers, $12 to $15 per month, for 8 months, not including winter months. Mechanics more. Female domestics, $1 50 to $2 per week.

Plymouth county.—Agricultural, 75 cents to $1 per day. Mechanics; $1 25 to $2 50 per day.

New York.

Niagara county.—Farm laborers, from $10 to $12 per month. Female domestics, 75 cents to $1 50 per week.

Monroe county.—Agricultural laborers, $10 to $12 per month. Female domestics, $1 to $1 50 per week.

St. Lawrence county.—Agricultural laborers, $15 in summer,

and $8 to $10 per month about 4 months of the winter season. Female labor 75 cents to $1 per week.

Yates county.—Agricultural laborers, $11 per month.

Erie county.—Agricultural laborers, 50 cents per day. Mechanical, $1 25 per day. Females, $1 per week.

Suffolk county, (L. I.)—Agricultural laborers, $8 to $12 per month. Mechanical, 75 cents to $1 25 per day. Females, $3 to $5 per month.

Orleans county.—Agricultural, $15 per month. Mechanical, $1 50 to $2 per day. Female domestics, $1 25 per week.

Ulster county.—Agricultural laborers, $100 to $150 per year, boarded, washing, &c. Mechanics, $1 to $1 75 per day, and board. Female domestics, from 75 cents to $1 25 per week.

Madison county.—Agricultural, $10 to $15 per month; 50 cents to $1 per day, and board. Mechanics, $1 to $1 25 per day. Female labor, from $1 to $1 50 per week.

Sullivan county.—Agricultural, $10 to $15 per month. Mechanical, $1 to $1 25 per day. Female, 75 cents to $1 25 per week.

Rensselaer county.—Agricultural, $10 per month. Mechanics, $15. Females, $5 per month.

New Jersey.

Camden county.—$11 to $12 per month and board, or 75 cents per day and not found, for workingmen. Mechanics, $1 50 per per day. Female, $1 per week.

Camden, (again.)—Agricultural laborers, $1 per day and not found, or $12 per month and found. Mechanics, $1 50 per day; female domestics, 25 cents per day and found.

Mercer county.—Agricultural laborers, $120 per year and boarded. Mechanics, about $1 50 per day. Female domestics, $1 per week, with board.

Monmouth county.—Agricultural laborers, from $8 to $10 per month, and boarded. Mechanics, $1 to $1 50 per day. Female domestics, $4 per month, with board.

Pennsylvania.

Delaware county.—Agricultural laborers, $8 to $12 per month, and boarded; per day, 50 cents; in harvest, $1. Female domestics, $1 to $1 50 per week. Mechanics, $12 to $20 per month, and boarded.

Lancaster county.—Agricultural laborers, $10 to $15 per month, or 50 cents per day, excepting in haying and harvesting, then $1. Mechanics, $1 per day. Female domestics, $4 per month, or $1 to $1 50 per week.

Adams county.—Farm hands, from $7 to $10 per month. Day laborers, 50 cents per day. Mechanics, 50 cents to $1 50 per day. Female domestics, $2 to $4 per month.

Dauphin county.—Farm hands, $9 per month. Day laborers, 50 cents, and boarded. Mechanics, $1 to $1 50 per day. Female domestics, $1 per month.

Fayette county.—Harvest hands, 62½ to 75 cents, and found. Mechanics, $1 per day, and board. Female domestics, $1 per week.

Franklin county.—Agricultural laborers, $8 per month. Mechanical, $12. Domestics, $3 per month. All boarded.

Maryland.

Prince George county.—Agricultural laborers, $3 per month, and found. Mechanics, $20 per month. Domestics, $5 per month, and found.

Virginia.

Princess Ann county.—Agricultural laborers, $5 per month and board; mechanics, $1 to $1 50 per day and board; female domestics, $2 to $2 50 per month and board. The male adult slave hires from $70 to $80, and the female at $40 to $50. All the expenses (except medical) paid by the one who hires. Established expense of hire and expense of male slave, $115 to $125 per annum; female, $85 to $95.

Buckingham county.—Agricultural labor varies from 25 cents to $1 per day, according to season. Mechanics, $1 per day.

Nansemond county.—Agricultural labor, $110 per year; mechanical, 75 cents to $1 per day and found. Female domestics, $20 or $30 per year, clothing and board found.

Brooke county.—Agricultural labor, $120 per year and found; mechanics, $1 25 per day; female domestics, $1 per week.

Monongahalia county.—Agricultural labor, 50 cents per day; mechanical, $1 12½ per day; domestics, 75 cents per week.

Sussex county.—Male hands, $60; boys, $25 to $30 per year; mechanics, 50 cents to $1 50 per day.

South Carolina.

Newberry district.—Agricultural, male, 75 cents to $1; mechanics, about $200 per year; female domestics, $50 per year.

Georgia.

Cass county.—Agricultural labor, $10 per month; mechanics, $12 to $25 per month.

Carroll county.—Wages of labor, $10 per month.

Walker county.—Agricultural, 30 cents; mechanical, $1; female domestics, 20 cents per day.

Hancock county, &c.—For farm managers or overseers, $300 per annum; in small farms, $200; and from that price to $400, in proportion to the number of hands and skill of the manager. Mechanics, from $1 to $1 50 per day. Farm hands, men, $5 per month; females, $4 per month; female domestics, $4 to $4 50 per month.

Alabama.

Barbour county.—Field hands, 50 cents per day and found; mechanics, $30 per month and found. Females, $6 to $8 per month for domestics.

Mississippi.

Copiah county.—Agricultural laborers, $10 per month for men; $8 per month for women; mechanics, first rate ones, $35 to $40 per month.

Tennessee.

Pikeville, Bledsoe county.—Agricultural, 33⅓ cents per day; mechanical, 75 cents per day; female laborers, 16⅔ cents per day.

Smith county.—Men on the farm, $8 in summer, $7 in fall and winter, or $50 to $60 per year for slaves; mechanics, from 50 cents to $2 per day; female slaves, $25 to $40 per year.

Jacksonboro', (E. T.)—Agricultural, $100 per annum, including board and lodging; $60 dollars per year for male slaves.

Kentucky.

Greenup county.—Common laborers, $15 per month; mechanics, $1 to $1 80 per day; female domestics, $7 per month.

Ohio.

Highland county.—Agricultural laborers, $10 to $15 per month; mechanics, $100 to $150 per year; female domestics, $1 per week.

Richland county.—$10 to $12 per month; mechanics, $18 per month; female domestics, $1 per week, including board.

Licking county.—Agricultural laborers, $10 per month; mechanics, $10 to $25 per month.

Morgan county.—Agricultural laborers, 50 cents per day, and found, and during harvest, $1 to $1 50 per day; mechanics, $1 to $1 50 per day; female domestics in towns, $1 per week, with board. Out of town, 75 cents per week.

Defiance county.—Agricultural laborers, $10 per month, and board; mechanical, $1 25, finding themselves; female domestics, $1 per week.

Tuscarawas county.—Agricultural laborers, from $9 to $12 per month, and board; females, from $3 to $4 per month, and board.

Wayne county.—Agricultural laborers, $10 per month; mechanics, $1 25 per day; females, $1 per week.

Delaware county.—Agricultural, 50 cents per day; female domestics, 25 cents per day.

Indiana.

Gibson county.—Farm hands, ten dollars to fifteen dollars per month; female domestics, four dollars per month.

Wayne county.—Agricultural laborers, ten dollars to twelve dollars per month; mechanics, one dollar to one dollar and twenty-five cents per day; day laborers, on roads and threshing grain, 88 cents; female domestics, 75 cents to one dollar per week.

Laporte county.—Agricultural laborers, twelve dollars per month; mechanics, one dollar per day; female domestics, one dollar to one dollar and fifty cents per week.

Marion county.—Farm hands, ten dollars to twelve dollars per month—ten dollars by the year; mechanics, one dollar to one dollar and twenty five cents per day; females, one dollar per week.

Wabash county.—Agricultural laborers, eleven dollars to fifteen dollars per month.

Orange county.—Agricultural laborers, nine dollars per month: mechanics, 50 cents higher: females, 75 cents per week.

Noble county.—Agricultural laborers, eleven dollars per month: mechanics, one dollar per day: female laborers, one dollar per week.

White county.—Agricultural laborers, ten dollars per month: mechanics, one dollar to one dollar and twenty-five cents per day: female domestics, one dollar per week.

Bartholomew county.—Agricultural laborers, ten dollars per month: mechanics, one dollar per day: female domestics, one dollar per week.

Greene county.—Agricultural laborers, ten dollars per month: mechanics, one dollar per day: domestics, one dollar per week.

Illinois.

Putnam county.—Agricultural laborers, $12; mechanical, $25. Female, $5 per month.

Union county.—Agricultural laborers, 25 to 50 cents per day; mechanical, $1 to $2 per day. Female domestics, $1 to $1 25 per week.

Randolph county.—Agricultural laborers, $10 to $12 per month, or 50 cents per day; mechanics, from 75 cents to $2 per day. Female domestics, 50 cents per week.

Jackson county.—Agricultural laborers, $8 to $10 per month; mechanics, $1 to $1 50 per day. Female domestics, 75 cents to $1 per week.

De Witt county.—Agricultural laborers, $10 per month; mechanical, $1 25 to $1 50 per day. Female domestics, $1 per week.

Michigan.

Wayne county.—Agricultural laborers, $10 per month; mechanical, $1 50 per day. Female domestics, $1 per week.

Oakland county.—Agricultural or farm hands, $10 to $12; carpenters, $1 per day. Female domestics, $1 25 per week.

Hillsdale county.—Agricultural laborers, from 75 cents per day to $10 or $13 per month; mechanics, $1 to $1 50 per day. Females, fifty cents to one dollar per week.

Washtenaw county.—Agricultural laborers, twelve dollars per month; mechanical, two dollars per day. Female domestics, five dollars per month.

Monroe county.—Agricultural laborers, twelve dollars per month; mechanical, $1 25 to $1 75 per day. Female domestics, one dollar to one dollar and fifty cents per week. Harvest hands, one dollar to one dollar and a quarter per day.

Iowa.

Henry county.—Farm laborers, in the summer, eight to ten dollars per month, or fifty cents per day—in harvest, fifteen dollars per month—in winter, six to ten dollars per month; mechanics, one dollar per day, or fifteen to twenty dollars per month. Female domestics, one dollar to one dollar and fifty cents per week.

Lee county.—Agricultural laborers, ten to sixteen dollars per month.

Racine county.—Agricultural laborers, from ten to fifteen dollars per month, and board. Females, one dollar to one dollar and fifty cents per week.

Van Buren county.—Agricultural laborers, from ten to fifteen dollars per month, or fifty cents per day.

Texas.

Grimes county.—Agricultural labor, twelve dollars per month, or fifty cents per day; mechanical labor, one to three dollars per day; blacksmiths, rough carpenters, grist and millwrights, cabinet makers and shoemakers most needed.

Robertson county.—Mechanical laborers, one to two dollars per day, and board; agricultural laborers, (black men,) eight to ten dollars per month; black women, five to seven dollars per month.

PRICE OF TRANSPORTATION TO MARKET.

Maine.

Freedom.—1 shilling per 100 lbs., for 16 miles, by teams.

West Ripley.—To Bangor, $7 per ton, by teams.

New Hampshire.

Gilsum.—$4 per ton.

Northampton.—Trifling.

Massachusetts.

Richmond, Berkshire county.—To Boston, for live stock, 40 cents per 100 lbs.; grain, roots, and vegetables, 20 cents per 100 lbs.; 35 cents per hundred for wool.

Essex county.—Expense small.

Vermont.

Springfield.—$15 per ton formerly; in the proximity of railroads lessened from one half to two two-thirds.

Hyde Park.—83 cents, to Boston, per hundred.

Poultney.—50 cents per hundred.

St. Albans, Franklin county.—$4 per ton.

New York.

Portland, Chautauque county.—Prices governed by the lake trade. This season 15 cents per 100 lbs. to Buffalo, and 20 cents barrel bulk.

Binghamton.—8 to 12 cents per bushel for grain, and about 40 cents per 100 lbs. for barley and grass. Freight depends on canal tolls. Market, New York city.

Yates county.—Wheat, per bushel, 13 cents to New York.

Wheatland, Monroe county.—Flour, to New York, 56 cents per bbl.

Albion, Orleans county.—40 cents per 100 lbs.

New Jersey.

Camden county.—Over the Delaware, to Philadelphia, including ferriage, $2 60 per ton.

Haddonfield, six miles from Philadelphia.—Excellent turnpike and cheap toll; 10 cents for 2 horses. We cart our produce to market, with our own teams, at a small cost. Sell our wheat at our own mills.

Monmouth county.—3 cents per bushel.

Pennsylvania.

Adams county.—To Baltimore, 20 cents per 100 lbs. Freight will be materially lessened if the branch railroad to Huron, York county, is made.

New Providence, Lancaster county.—30 cents per bbl. for flour, 10 cents per bushel for wheat, 9 cents per bushel for corn.

Paradise, Lancaster county.—Flour, from Lancaster to Philadelphia, 28 cents per bbl.; wheat, 8 cents per bushel; corn and rye, 8 cents; oats, 5 cents; potatoes, at 9 to 10 cents per bushel.

Dauphin county.—10 cents per ton, to Philadelphia or Baltimore, for wheat, rye, and corn.

Chambersburg.—To Baltimore, 62½ to 75 cents per 100 lbs. To Philadelphia, by railroad, 70 cents per bbl. of flour, and 50 cents per 100 for general loading; 20 cents per bushel for wheat, rye, and corn.

Lima, Delaware county.—Whole produce sold, averaging 8 per cent., to Philadelphia.

Maryland.

Prince George county.—5 cents per bushel, or 75 cents per hhd. of tobacco.

Virginia.

Warren county.—Flour, to Winchester, 50 cents per bbl.; wheat, 10 cents per bushel. Flour, to Baltimore, by railroad, 87½ cents per bbl.; to Alexandria and Georgetown, by the river, 80 cents per bbl.

Nansemond, county.—Corn and wheat, 3 or 4 cents per bushel, to Norfolk, and 6 or 8 cents to Richmond, Baltimore, and New York; and other articles in proportion.

Buckingham county.—20 per cent. for wheat and corn, and 10 per cent. for tobacco.

Bethany, Brooke county.—5 cents. per bushel for wheat, 3 cents for Indian corn; hay, $3 per ton; oats, 3 cents per bushel; wool, 10 per cent. the value when sent to eastern cities.

South Carolina.

Newberry district.—To Columbia, 45 miles, 50 cents each way, (per 100 lb.)

Dunlapville.—50 to 62½ cents per 100 lbs., to Columbia.

Georgia.

Cassville.—Indian corn, to Charleston, South Carolina, 21 cents; wheat, oats, &c., 22 cents; cotton, 75 cents per 100 lbs.

Carroll county.—50 cents per 100.

Walker county.—To railroad, 25 cents per 100 lbs.; to Augusta, 85 cents.

Indiana.

Wabash county.—To Toledo, 11 to 18 cents per 60 pounds.

Orange county.—Wheat, 20 cents per 60 pounds; corn, 20 cents per 56 pounds. Other articles that have to be hauled, about same rates.

Indianapolis, Marion county.—On the railroad, 50 cents per head for hogs to Madison, 82 miles—wheat, 9 cents per bushel; corn, 6 cents per bushel; flour, 35 cents per barrel; freight in general, 35 cents per 100 pounds.

Albion, Noble county.—To canal at Fort Wayne, 12½ cents per bushel, 30 miles.

La Porte, Indiana.—Wheat, to Buffalo 10 to 15 cents—have paid 25, and have had it carried for 4 cents, and can be afforded at this price; railroad in progress will reduce freights.

Monticello.—Sold to dealers, 10 to 25 miles distant—freight thence to New York, average twenty-five dollars per ton, and ten to twelve dollars per ton to New Orleans.

Illinois.

Murfreesboro'.—Fifty cents to one dollar per cwt., according to the article.

Waynesville, De Witt county.—Seventy-five cents per one hundred pounds.

Hobbs' Ridge, Randolph county.—Nearly one dollar and a half per ton for ten miles.

Hennepin, Putnam county.—Five to ten cents for 60 pounds, for grain, to Chicago and St. Louis.

Alabama.

Jackson county.—Fifty cents per 100 pounds to New Orleans.

Barbour county.—Cotton, one dollar per bale from any point on the Chattahoochie river to Appalachicola; other goods by barrel measurement, at the rate of fifty cents per barrel.

Mississippi.

Gallatin, Copiah county.—For cotton, &c., fifty cents to one dollar per 100 pounds, according to distance; 75 cents average.

Tennessee.

Pikesville.—Seventy cents to $1 35 per 100 pounds.

Kentucky.

Greenup county.—To Cincinnati, one dollar per ton; to Wheeling, two dollars and a half per ton; to Pittsburg, three dollars per ton.

Ohio.

Highland county.—To Cincinnati, fifty cents.

Morgan county.—Flour, to New Orleans, 43 cents per barrel; to New York, one dollar and a half per barrel.

Defiance county.—Six cents per bushel for corn and wheat; from Toledo to Buffalo, two and a half to four cents.

Harlem, Delaware county.—Fourteen cents per 100 pounds.

Centreville, Wayne county.—Average, 20 cents per 100 pounds, by way of Whitewater Valley canal, to Cincinnati; formerly lower, but freshets have damaged canal, and freights now are high.

Newark.—One dollar and twenty-five cents per 100 pounds.

Michigan.

Oakland county.—Flour, to New York, $1 12½ per barrel.

Hillsdale county.—Fifty per cent. to New York.

Ann Arbor, Washtenaw county.—One dollar per barrel for flour to New York; 75 cents per cwt. for other articles.

Iowa.

Henry county.—Corn, $6\frac{1}{4}$ cents per bushel; oats, 4 cents; pork, $12\frac{1}{2}$ cents per 100 pounds—to Burlington.

Texas.

Wheelock, Robertson county.—Produce, to market, 75 cents per 100 pounds for 100 miles; merchandise, to the interior, one dollar to one dollar and twenty-five cents per 100 pounds for 100 miles.

Grimes county.—From Anderson county seat to Houston, 75 miles, (no rivers or large water courses to cross,) roads, when good, of a dry season, the price of transportation is 50 cents per 100 pounds; of a wet season, and when roads are much used, they become bad, and then the price is increased.

APPENDIX No. 13.

ICE TRADE.—BY N. J. WYETH, CAMBRIDGE, MASS.

The ice trade of the United States was commenced by Frederic Tudor, of Boston, in 1805. This gentleman, having previously sent agents to the West Indies to procure information, determined to make his first experiment in that region. The first cargo was taken from a pond in Taugus, and was laden on board the brig Favorite, for St. Pierre, Martinique.

This first enterprise resulted in a loss of about $4,500; but was, nevertheless, followed up until the embargo and war put an end to the foreign trade, at which period it had yielded no profit to its projector. Its operations had been confined to Martinique and Jamaica. At the close of the war, in 1815, Mr. Tudor recommenced his operations by shipments to Havana, under a contract with the government of Cuba, which enabled him to pursue his undertaking without loss, and extend it, in 1817, to Charleston, South Carolina; in the following year, to Savannah, Georgia; and, in 1820, to New Orleans. In the meantime, it had been tried again (by other parties) at Martinique and St. Thomas, and failed, and by Mr. Tudor at St. Jago de Cuba, where it also failed after a trial of three years.

On the 18th May, 1833, the first shipment of ice was made to the East Indies, by Mr. Tudor, in the ship Tuscany for Calcutta; and, since that period, he has extended his operations to Madras and Bombay. Previous to 1832, the trade had been chiefly confined to the operations of the original projector. The increase of shipments to this period were small, the whole amounting in 1832 to 4,352 tons, which was taken entirely from Fresh pond, in Cambridge. Up to this time the ice business was of a very complicated nature. Ship owners objected to receive it in freight, fearing its effect on the durability of their vessels, and the safety of voyages; ice houses abroad and at home were required, and the proper mode of constructing them was to be ascertained. The best modes of preparing ships were the subject of expensive and and almost endless experiments. The machines to cut and prepare ice for shipping and storing, and to perform the operations of hoisting it into storehouses and lowering it into the holds of vessels, were all to be invented, involving much expense and vexation. Many of these difficulties have now been overcome, and, since 1832, the trade has increased much, and appears destined to a still more rapid increase. It has also been divided among many parties, and its methods have been improved, and a knowledge of them more widely diffused. The ice has been chiefly taken from Fresh and Spy ponds, and, since 1841, mainly transported on the

Charleston branch railroad. Recently, ice establishments have been made at most of the ponds near Boston, and it is probable that in a few years the product of all these waters may be required to supply the trade. In the year 1839, the great quantity of ice cut at Fresh pond, and the consequent difficulties which had arisen between the proprietors of its borders as to where each should take ice, induced them to place boundary lines, which were settled by Simon Greenleaf, Levi Farwell, and J. M. Felton, on the principle of giving to each the same proportion of contiguous surface of the lake as the length of his shore line was to its whole border. This settlement was made by partition deed, executed by all the parties, and recorded in the registry of deeds of Middlesex county. Published maps were also placed in public institutions and private hands.

These maps show the length and direction of the boundary lines and the area of each owner. This arrangement has been of great advantage, enabling the parties to secure more ice than could otherwise be taken from a pond of equal extent.

The shipments of ice from Boston coastwise for the year ending December 31, 1848, amounted to 43,125 tons, and were made to the following places:

Philadelphia	3,000
Baltimore	3,000
Georgetown, D. C. / Washington, D. C. / Alexandria, D. C.	700
Richmond, Va	400
Portsmouth, Va	300
Norfolk, Va	1,200
Fredericksburgh, Va	100
Wilmington, N. C	800
Fayetteville, N. C	125
Washington, N. C	200
Charleston, S. C	3,500
Beaufort, S. C	100
Savannah, Ga	1,000
Augusta, Ga	400
Mobile, Ala	2,500
Pensacola, Fa	300
Appalachicola, Fa	500
New Orleans, La	25,000
Total tons	43,125

These shipments were made in ships, 41; barques, 33; brigs, 39; schooners, 128; making, in all, 241 vessels.

The ice shipped to foreign ports during the same period, amounted to 17,300 tons, and was sent to the following places:

Calcutta and East Indies	6,900 tons.
Liverpool, England	600 "
Rio Janeiro	1,325 "

Havana	1,575 tons.
Matanzas	600 "
St. Jago	675 "
St. John's, P. R	500 "
Kingston	865 "
Barbadoes	968 "
Guadaloupe	300 "
St. Thomas	700 "
St. Vincent	240 "
Nassau	295 "
Belize	317 "
Vera Cruz	260 "
Demerara	320 "
Port Spain	645 "
Port Louis	425 "
Pernambuco	110 "
Cape Town	280 "
Total	17,300 tons.

These shipments were made in 22 ships, 19 barks, 31 brigs, 13 schooners; making, in all, 85 vessels.

The freight paid during the year is supposed to have averaged as high as $1 50 per ton; at which rate it would amount, on the 60,425 tons shipped abroad and coastwise, to $90,637 50.

There is a great variation in the cost of ice, caused by winters favorable or otherwise for securing it, and by the greater or less expense of the fittings required for voyages of different duration, or by difference of season when the shipments are made. The winter of 1848 was very mild, and the expense of storing and shipping ice was much increased, and probably its cost, stowed on board, was as much as $2 50 per ton; which would give, for the quantity shipped	151,062 50
In 1848, eighteen cargoes of provisions, fruits and vegetables were shipped in ice to ports where, otherwise, such articles could not be sent—say to Barbadoes, Demerara, St. Vincents, Guadaloupe, St. Thomas, and Calcutta—the invoiced cost of which, at Boston, would average about $2,500 each	45,000 00
To these items may be added the profits of the trade to those engaged in it	100,000 00
Total returns	296,062 50
	90,637 50
	386,700 00

During the year 1848, a very small supply of ice was stored near Boston, and the cost and price were much increased, which will account for the reduced amount of the trade, as compared with the previous year.

It is probable that the commercial marine of the United States has been materially increased by the operations of the ice trade. A large portion of the vessels formerly engaged in the freighting trade from Boston sailed in ballast, depending for remuneration on the freights of cotton, rice, tobacco and sugar, to be obtained in more southern latitudes, often competing with the vessels of other nations, which could earn a freight out and home; but since this trade has been established, a small outward freight from Boston can be obtained for the transportation of ice to those places where freighting vessels ordinarily obtain cargoes. The ice trade has generally been unsuccessful to places where profitable return freights cannot be obtained, because to such places a heavy freight must be paid on the ice, which it cannot bear; and, also, because southern places which do not produce valuable exports are usually unable to consume expensive luxuries. The methods and materials for preparing vessels for the transportation of ice have been various. Formerly, the holds were ceiled up at the sides, bottom and top, with boards nailed to joist ribs secured to the skin of the vessel, and with double bulkheads fore and aft. The spaces thus formed were filled with refuse tan, rice hulls, meadow hay, straw, wood shavings, or like materials. These spaces were made of a thickness proportionate to the length of the voyage and with reference to the length of the season. The immediate surface of the ice was covered with the same materials, excepting tan. At the present time, sawdust is used almost exclusively for voyages of considerable length. It is placed immediately between the ice and the skin of the vessel. This material is obtained from the State of Maine, and before its use for this purpose, was entirely wasted at the water mills, and falling into the streams, occasioned serious obstructions.

During the year 1848, 3,900 cords were brought to Boston, at an average value of $2 50 per cord, delivered. The lumber is also wholly from the State of Maine; the value of it is, however, small in the present mode of fitting vessels.

About the whole value of the returns of the ice trade, including freight, are a gain to this country. The ice itself, the labor expended on it, the materials for its preservation, and the means of its transportation, would be worthless if the trade did not exist. The prices at which ice sells, in places where there is competition, vary constantly. In Havana, where there is a monopoly, it is sold at 6¼ cents per pound, and there the trade has not increased since 1832, when the shipments were 1,112 tons; while at New Orleans, where it has been sold from half a cent to 3 cents per pound, it has increased during the same period from 2,310 tons to upwards of 28,000. At Calcutta, the trade commenced in 1833 with a shipment for that year of 201 tons, and the price has never been above 6 cents per pound, and is now about 2½ cents. The export to that place had increased in 1847 to 3,000 tons, but probably less than

one-fifth of that quantity is actually sold, owing to the great length of the voyage. The consumption of ice in Boston and its vicinity during the year ending 31st December, 1847, was 27,000 tons, about two-thirds of which was transported to Charlestown in the Charlestown Branch railroad, and thence distributed on wagons through that place and Boston.

The remainder was sent direct from the ice houses on wagons to the place of ultimate delivery; 22 two-horse and 44 one-horse wagons were employed in the delivery of this ice, for a time probably equal to four and a half months, at an expense for two-horse wagons of $4 per day, including drivers and tolls, or for 22 wagons..	$11,880
And for 44 one-horse wagons, at $2 75 per day for the same period..........	16,335
The cost of putting up and securing ice varies essentially with the character of the seasons, but must average, with the rent of the buildings in which it is stored, and the rent of the "ice privileges" from which it is taken, and the waste which unavoidably occurs, as much as 65 cents per ton, or, for 27,000 tons..........	17,550
To which should be added the transportation by railroad of 18,000 tons, say average 50 cents per ton	9,000
Total cost..........	$54,765

It is retailed at prices varying as the quantities delivered are larger or smaller. It is supposed to have averaged in 1847 about $13\frac{1}{2}$ cents per 100 lbs., or, for 27,000 tons, $72,900, leaving a profit of $18,135 to be divided among the seven principal ice dealers.

Ice being shipped and used at all seasons, large storehouses are required to preserve it. Exclusive of ice houses on the wharves at Charlestown and East Boston, there had been erected, in 1848 and previously:

At Fresh pond, West Cambridge, houses capable of containing..........	89,000 tons.
At Spy pond, West Cambridge..........	31,000 "
At Little pond, West Cambridge..........	2,400 "
At Wenham pond, in Wenham..........	13,000 "
At Eel pond, Malden..........	2,000 "
At Horn Pond, Woburn..........	4,000 "
At Sumner's pond..........	1,200 "
At Silver lake, Plympton..........	5,000 "
At Souhegan lake, South Reading..........	8,000 "
At Medford lake, in Medford..........	4,000 "
Total..........	159,600 tons.

The ice houses which supply the ice for New York and its vicinity will contain 165,500 tons, and are at

Rockland lake	65,000 tons.
Kingston creek	9,000 "
Catskill creek	11,000 "
Hudson river	24,000 "
Fort Montgomery pond	12,000 "
New Rochelle	10,000 "
Staten Island	3,000 "
Albany	12,000 "
Troy	5,000 "
Saracen	8,000 "
Newark	3,000 "
Princeton	1,000 "
Trenton	1,500 "

The ice stored is chiefly for use in and near the city, the shipments being very small; it is supposed that 40 per cent of the ice cut for the use of families is ordinarily delivered at the doors of the dwellings, or 65,800 tons. The average price obtained may be stated at $2 50 per ton of 2,000 lbs., which will give 164,500 as the value of the ice consumed in and near the city.

From the Kennebec river there was shipped, in 1848, 4,000 tons, chiefly to Philadelphia and Baltimore, at a price of $4 per ton, delivered in those places. The trade in ice from this river is very uncertain, and depends almost entirely upon a scarcity of the article at Boston, which occurred in 1848, from whence ice can be shipped more advantageously in good seasons.

At and near Providence about 8,000 tons were stored in 1848; 423 tons of which were shipped in six vessels, say three to City Point, Va., one to Norfolk, one to Wilmington, and one to Cuba. And these cargoes were put on board at $1 50 per ton; the freight paid was $1 25 per ton; say value ice shipped

say value ice shipped	$634 50
Freight earned	528 75
Total value shipped	$1,163 25
Value of ice used in families in and near Providence, say 7,577 tons, 50 per cent. actually delivered on 3,788 tons at $3 per ton	11,364 00
Total value of ice consumed and shipped in and near Providence	$12,527 25

At New Bedford and Fairhaven there were stored, in 1848, about 8,000 tons; about 1,000 of which was used in manufacturing winter strained oil, which was sold at an average price of $2 50 per ton	$2,500 00
2,000 tons were used for the preservation of fresh fish, supplied to vessels from Stonington, New London, Mystick, Newark, and Sag Harbor, at about $2 50 per ton	5,000 00

Deducting the amounts stated above, and calculating the average delivery at 50 per cent., there would be left from 8,000 tons stored, 1,000 tons for the family consumption of this vicinity, which, at $3 per ton, delivered at the dwellings, would give............	3,000 00
Making the whole value of the trade in this vicinity..	$18,500 00

The ice houses now in use in this vicinity are built above ground. In southern countries where ice is most valuable, they are constructed at greater expense, usually of brick or stone, and the protection to the ice consists in air spaces, or in dry light vegetable substances enclosed between two walls. On the borders of the lakes where ice is least valuable, they are usually built of wood, in which case they are of two walls formed by placing two ranges of joist upright, framed into plates at the top, and placed in the ground at the bottom, or framed into sills; these two ranges are ceiled with boards secured to that side of each range which is nearest the other, and the space between the two boardings filled with refuse tan wet from the yards. This wet tan is frozen during the winter, and until it is thawed in the spring and summer little waste occurs. Afterward the waste is more rapid, but as a large portion of the ice is shipped or used before this takes place, the loss in quantity is small, and occurring before the expenses of transportation have been paid, is of less pecuniary moment. In one instance brick has been used in the construction of an ice house which covers 36,000 feet of land; the vaults of this house are 40 feet in depth, and its walls are four feet thick from outside to inside, enclosing two sets of air spaces. Such a construction is more costly, but has the advantage of durability and safety from fire to which ice houses are much exposed from the frequent juxtaposition of railroad engines to the light dry materials used to cover and otherwise preserve ice.

In the winter of 1848, about $750 were paid daily for labor of men, and about $300 for that of animals, in the vicinity of Boston, when the weather was most favorable for cutting ice. Such activity, however, is of short duration, as there are not generally more than twenty days in a season which are really favorable to the operations of securing ice. The price paid is usually $1 per day for horses and men. At first the implements of husbandry only were used in securing ice, but as the trade became more important other machines and different methods were adopted, and abandoned when better were brought forward, or when the increased magnitude of the business required greater facilities. The endless chain, moved by a steam engine, has been used for elevating ice near Boston and New York with success, and in one instance, by this method, over 500 tons have been elevated 35 feet in one hour; but this method involves much expense, and is suitable only for extensive operations; and at present horse power is more used than any other. More ice is now secured in one favorable day than would have supplied the whole trade in 1832. Ordinarily before

there has been cold enough to form ice of suitable thickness, snow falls on its surface. If this occurs when ice is four or more inches in thickness, and the snow is not heavy enough to sink the ice, it can be removed by using horses attached to the "snow scaper," and under such circumstances this is the method in common use. But if snow falls so heavy as to bring the water above the surface of the ice, it is removed after it is congealed into snow-ice with the "ice plane," which takes off about two inches deep and twenty-two wide of its surface.

This machine is drawn by two horses, and is guided by inserting its guides into two groves previously made with the "ice-cutter." The chips made by it are scraped off in the same manner as dry snow.

These preliminary expenses are often very great; frequently after much expense has been incurred to remove a body of snow or snow ice, the weather becomes warm and spoils the ice on which so much has been expended. And, on the other hand, if it is not done, and the cold continues, there will be little or no increase of thickness to the ice, which is equally a disaster. When ice has been formed of sufficient thickness, and freed from snow ice, it is reduced to blocks of uniform size, ordinarily 22 inches square, by the "ice cutter." This machine is similar to a carpenter's plough, except that it has a series of cutting chissels, one succeeding another, and deepening the groove. It is drawn by a horse, and cuts at one passage about two inches deep, and if the ice requires to be planed to remove snow ice, the guides of the snow plane are used in grooves of this depth; but, when grooves are required to split it, the "ice cutter" should be drawn two or three times through each. These grooves should be parallel to each other; and, to make them so, the "ice cutter" has a guide, which is placed in the last groove made. When the grooves in one direction have been made, others at right angles with them are produced in the same manner. After this has been done, one groove at the end is opened, and also the two outside grooves; a wedging bar is then stricken into the groove next the end one, and at several places along its length, which detaches it easily from the mass; the same bar is forced with a slight blow into the transverse grooves, which reduces the ice to very uniform square blocks. The blocks thus formed are brought to the receiving doors of the ice houses (which are built on the immediate borders of the ponds) either by placing them on sleds, or floating in canals cut through the ice. The ice is placed in the houses in regular courses, every block covering the next below it. When a vault has been filled, it is immediately covered with wood shavings, and the receiving doors fitted up to prevent waste, until the contents are required for shipment abroad, or use at home.

The weight of ice for shipment is usually determined at the wharves, immediately before being put on shipboard, on scales which have been constructed for that purpose; and this single operation settles the weight to be paid for by the party for whose account the ice is shipped, the amount due for freight on shipboard, for transportation on the railroad, and that which is to be received by the owner of the ice.

APPENDIX No. 14.

REVIEW OF THE ENGLISH MARKETS FOR AMERICAN FLOUR, GRAIN, AND PROVISIONS.

For the following review by Messrs. J. & C. Kirkpatrick, of Liverpool, of the English trade in American flour, grain, and provisions, and for the very valuable tables which follow it, we are indebted to Charles Kirkpatrick, esq., of the city of New York.

LIVERPOOL, 10*th February*, 1849.

Having delayed our annual exposition of the trade between the United States and this country in breadstuffs and provisions, for the purpose of being able to embrace some statements of imports, &c., from the "Board of Trade Tables," just published, we now purpose to take a review of the trade during the past year, with the view of eliciting such facts therefrom as shall serve to guide our friends who are interested in forming a correct judgment as to the probable future course of prices.

The peculiarity which marked most prominently the transactions of the past year in every department of business was the almost complete absence of speculation—the course of prices throughout having been regulated accordingly as each article was in demand relatively with the supply. This has been the case especially with breadstuffs—the trade, during the whole year, having been in a very lifeless state, thus presenting a very marked contrast with the prevailing tone of the market during the preceding year. The disasters which attended the excessive speculation of the former period sufficiently account for this change, while the yet unrevealed effects of a prospective free trade in grain served to induce caution on the part of all parties in advance of the period when the new law was to come into operation; and, by leading farmers and other holders to part with their stocks more freely than usual, caused the result of the repeal of the corn laws to be in some measure anticipated. The fluctuations in the value of wheat have been less than usual—the highest gazette average being 56*s*. 10*d*. on September 9, and the lowest, 46*s*. 10*d*., on January 17. These averages, too, being made up from sales of English wheat only, show a wider range of fluctuation than characterized the general market—the difference between the highest and lowest points of prices, when taken from the average of the total sales of the year, being under 4*s*. per quarter. The imports have continued on an extensive scale, showing a larger aggregate than in any previous year, with the exception of 1847. The necessity for such an extensive import arose from the different distribution of the land in the United Kingdom, in 1847, under crops—the breadth under potatoes having been only

one-third of the usual quantity, and recent inquiries having shown that one acre of potatoes will support as many people as three acres of grain. The comparative freedom of the potato crop from disease in 1847 induced the farmers to plant an unusual quantity last year; and, though there was a very extensive failure of the crop in the southern and western counties, both of England and Ireland, the loss was compensated for by the greater breadth of land under crop, as well as by its general productiveness. As respects the other crops, it appears that, taking the whole of the grain districts of England, the crop of wheat was considerably below an average, and of grains, about an average. In Ireland, wheat was also a deficient crop, but oats a very abundant one. In Scotland, the crops generally were equal to the usual average. That there was, on the whole, a very deficient supply of food yielded by last harvest is evidenced by the fact that, while a larger proportion of the product of that crop has been brought to market up to this time than usual, there has been, during the same period, the largest import of agricultural produce into England that has ever taken place. Of grain of all kinds, the import has been over four millions of quarters, from the 1st of October till the 31st January, besides potatoes and vegetables to a large extent, from the near European ports. The whole of this quantity has passed into consumption—the stocks at the present time being hardly in excess of those held at the commencement of that period. The sliding scale of duties came to an end on the 31st January; and on the 1st instant, the whole of the stocks of grain in bond were released at the new fixed duty of 1*s.* per quarter. The total quantity then released was about one million of quarters; but, as usually happens in the case of all similar commercial changes, the effects of the change had been more than anticipated, and prices, instead of declining under the pressure of such a supply, have since then shown a tendency to advance.

In view of so many circumstances which now combine to disturb ordinary calculations, we cannot speak with much confidence as to the immediate future of prices; but looking at the enormous import of grain during the last four months, the comparatively small stocks now on hand, the increasing activity in the manufacturing districts, and the general employment of the population in profitable labor, together with the fact that no early arrivals can take place for the ensuing three months, there seems a strong probability that prices will advance, rather than recede from the present level. It is evident that we shall require a very large import of breadstuffs before the next harvest. What sources they will be drawn from will depend on the relative prices at the various shipping points. The latest quotations from all parts, as given in the comparative statement annexed, show that Europe at present offers the most inducement to purchasers.

With reference to the more remote future of prices, it is difficult to predict with anything like certainty what are the limits within which prices may fluctuate, under the operation of a free trade in grain, the establishment of which has introduced new ele-

ments for consideration in any attempt to construct a theory as to the future course of prices. As respects wheat, Mr. Tooke, in his "History of Prices," assumes that 30*s.* and 60*s.* will be respectively the lowest and highest limits of such fluctuation, and that 45*s.* being the mean between these extremes, will, probably, be the central or pivot point round which prices will ordinarily range. This, it will be seen by reference to the subjoined table, is considerably under the average of prices for the last twenty years, as taken from the official returns made to the government—the mean average of those years being 57*s.* 5*d.* Still, we are of opinion that Mr. Tooke has under estimated the effects of the repeal of the corn laws, and that the average price of wheat during the next ten years, with fair harvests, will not be over 42*s.* For Indian corn there has been a continuous demand throughout the year, without any of the violent fluctuations which characterized the trade during the previous year; and this cereal may now be considered one of the leading articles of import to our corn market. The extent to which it may be consumed will depend more on its price than in the case of any other grain; meeting, as it does, a large demand for cattle food when it bears a low value, and from which high prices would completely exclude it. In ordinary seasons, its range of price will probably be between 24*s.* and 32*s.*

That England will become, to some extent, an entrepot in which the surplus products of the corn producing countries of the world will be stored up, to be distributed again, as the necessities of each country may demand, seems one of the most certain results of a free trade in grain. Her central and insular position, her commercial connexion with all countries, her financial and other facilities for carrying on such a trade, joined to the circumstance that she is always an importing country, will combine to secure this result. The disturbed state of the continent during the past year prepared the way, and partly introduced such a trade as we have indicated; large quantities of wheat and flour having been poured into England from France and other neighboring countries for the purpose, and as the only means that offered of realizing the value of such produce. This course having been taken without reference to the ultimate wants of those countries, it is probable that some of them will have to import again before the next harvest, and that such import will be drawn from England, under a continuance of present prices.

Should these views be realized, and the same policy in other departments of trade in this country be fully carried out, England is likely to become, as a place of residence, one of the cheapest countries in the world; and, whatever may be the influence on the farming or other special interests, it is certain that the general interests of the country will be promoted, and the position of the laboring classes be much improved.

In reviewing the trade in provisions little more is required than a reference to its rapid and satisfactory extension as indicated by the returns of imports in the annexed tables, the increase not being

confined to certain articles, but embracing all. The arrivals, too, for so far this season, promises a still larger increase in the present year, while the more thorough adaptation of all articles to the requirements of the English market is certain to secure a still wider extension of the trade.

Of *beef*, the import in 1848 fell off considerably from that of the two preceding years, but it is likely to be the largest in the present year that has ever taken place. The best brands continue to give great satisfaction, and to bring prices highly remunerative, being generally preferred to Irish, while secondary and inferior brands are much more difficult of sale, even at a wide difference of price. The recent arrivals lead us to infer that the great bulk of the beef cured this season is of an inferior character, and the result of the shipments is likely, in consequence, to disappoint the owners. The present range of prices is from 78*s*. a 90*s*. per tierce.

Of *pork*, the only kind which has a continuous and steady sale is "prime mess," cut in 4 lb. pieces, and being used exclusively for ship stores, must be packed exactly in conformity with the established standard brands of Irish. In consequence of the extremely irregular quality of the imports, prices ranged from 34*s*. a 75*s*. during the past year. Our present quotations for prime brands are 70*s*. a 72*s*. 6*d*., owing to the bare state of the market. The ordinary range of prices will be from 50*s*. a 60*s*. American "mess pork" only finds a sale as a substitute for bacon, and its shipment to England is only justified when it bears a low value relatively with bacon. We have at present none on the market.

The trade in bacon has had during the past year a remarkable increase, the import into Liverpool alone being over 7,000 tons against 2,500 in 1847, before which year the trade can hardly be said to have existed. The late arrivals show a great improvement in quality, and in cut and cure over former receipts, and this article will now become one of steady and increasing import. *Hams* have been imported more freely; but do not offer any inducement to shippers, except when they reach a very low price in the United States, the flavor being so much injured by the modes of cure usually adopted, and by remaining so long in pickle or dry salt, that they cannot compete with the Irish cure. The duty of 7s. per cwt. imposed on dry hams, prevents their being shipped in that form, unless the quality is so superior as to warrant the payment of this duty. There is no article that would better reward curers for bestowing extra care in its preparation for the English market.

The trade in *lard* has also exhibited a remarkable increase, the import during the past year into this port having been 9,600 tons against 4,600 tons in 1847. Of this quantity, the principal part sold for culinary purposes, the price having remained too high relatively with tallow to induce any considerable demand from soap and candle manufacturers. Prices were well sustained during the greater part of the year, and ranged from 38*s*. a 45*s*.; but have continued to decline since November, owing in part to heavy im-

port, but principally to the low rates to which butter and tallow have declined—the one excluding it from manufacturing, and the other from culinary uses. Its present value is 34*s*. a 36*s*. for barrels, and 35*s*. a 37*s*. for kegs.

Of *cheese*, nothing need be said, the steady increase of the trade affording the best evidence that it is conducted with advantage both to the producer and consumer. It will be seen that the import of the past year has far exceeded that of any former one. The present range of prices is from 36*s*. a 48*s*.

It will be seen that, with the exception of the nominal duty of 1*s*. per quarter retained on grain, and a duty of 10*s*. per cwt. on cheese, all the articles referred to have a free admission into England; and this review of the trade, in connexion with the annexed tables, will show its progressive average up to this time.

We are your obedient servants,

J. & C. KIRKPATRICK.

Hon. EDMUND BURKE.

NEW YORK, *March* 8, 1849.

SIR: Enclosed I hand you, as promised, a circular giving some information as to the trade in corn and provisions between this country and Great Britain during the past year, accompanied by tables showing the growth of the trade, the yearly imports of grain into Great Britain, and the sources whence these supplies have been drawn, &c.; and, in order to show the movements of the trade in the present as compared with the corresponding periods of the two past seasons, I annex a statement giving the exports from the principal shipping points in this country to Great Britain and Ireland, from the 1st September till the 28th Feburuary in each season.

I am, sir, yours respectfully,

CHAS. KIRKPATRICK.

Hon. EDMUND BURKE.

[For the tables above mentioned, see pages 715 to 718.]

[This article should have preceded the letter of Messrs. Kirkpatrick, at page 704. The mistake was discovered too late to rectify it otherwise.]

Supply of grain raised in the United States for exportation to foreign countries; foreign demand; English demand for breadstuffs; Russia the great rival of the United States in the production of grain; quantity exported from Russia in 1847; *quantity exported from Odessa during eleven years, ending with* 1848; *review of the English market for American flour, grain and provisions; valuable tables; estimate of the value of the production of labor and capital in the United States in* 1848, *&c.*, *&c.*

In an appendix to the agricultural report for 1847, (No. 19,) we submitted an estimate of the production of the cereal grains of the United States in 1847; the consumption, and supplies for exportation; the demand of foreign countries for corn and breadstuffs, and the surpluses of grain raised by certain foreign countries for exportation.

We do not deem it necessary to go into similar estimates for the present year, as the general results cannot vary much from those contained in the paper alluded to, which was annexed to our last report. The general conclusion, in relation to the production and consumption of the Union, was that we could supply all the wants of our own population, and have remaining for exportation to foreign countries a surplus exceeding 200,000,000 bushels of grain of all kinds—the far greater proportion of which was maize or Indian corn. In our circular, issued during the last year, particular inquiries were made with respect to the consumption per head of the population, to which answers were obtained from almost every section of the Union. The general result, which a comparison of these returns (see appendix, Nos. 3 and 4, to the present report) enables us to arrive at, does not vary very much from the estimates in our report of 1847.—(See appendix No. 19.) We, therefore, do not deem it necessary in this report to go into similar estimates and calculations for the present year. We believe, if the foreign demand should require it, this country could export from 150,000,000 to 200,000,000 bushels of wheat and Indian corn. Of wheat, we could export from 30,000,000 to 40,000,000 bushels, if the foreign demand would require so great a quantity.

In the paper alluded to, (appendix No. 19, report for 1847,) we presented tables showing the probable annual demand of the grain importing countries, to which our farmers must look for a market; and the probable annual surpluses of the grain exporting countries, which, of course, would be our rivals in the corn trade. Our conclusion was that the demand of the grain importing countries would

be not far from 33,000,000 bushels annually; and the surpluses of the grain exporting countries would probably amount in the aggregate to 20,000,000 bushels. We should except Russia.

Of the grain importing countries, Great Britain demands the largest supplies from foreign countries, equalling about 20,000,000 bushels annually.

The following returns show the amount of corn of all kinds imported into Great Britain during eleven months, ending December 5, 1848:

TABLE.

	Imports.		Entered for consumption.	
	1847.	1848.	1847.	1848.
Wheat ....quarters...	2,418,342	2,058,736	2,613,506	1,821,191
Oats....................do.......	1,633,808	865,728	1,688,324	841,401
Corn....................do.......	3,560,266	1,397,338	3,500,547	1,393,599
Other grain.............do.......	1,351,609	1,449,504	1,444,884	398,821
Total grain.........do.......	8,964,025	5,771,306	9,247,261	4,455,012
Flour...................cwt......	6,296,661	1,157,917	6,776,436	1,074,461
Corn meal...............do.......	1,437,951	210,084	1,439,078	186,177
Other meal..............do.......	847,797	25,888	847,823	22,754
Total..............do.......	8,582,409	1,403,889	9,063,337	1,283,392

Thus it appears that during the period of eleven months, ending December 5, 1848, the imports of wheat into Great Britain amounted to 2,058,736 quarters; and of flour, to 1,157,917—which, reduced to bushels, gives 19,778,215 bushels of wheat imported. Our estimate of the demand of Great Britain was, therefore, not too great.

Great Britain has not for years produced a sufficient quantity of wheat to supply the consumption of the population. In appendix No. 19, of our report for 1847, we showed from the most authentic sources that the average quantity of wheat imported was 17,762,557 bushels; and the average quantity entered for consumption was 17,216,321 bushels. It is safe, therefore, to calculate upon an annual demand in future by Great Britain of 20,000,000 bushels.

In our survey of the countries which produce more grain than is consumed by their population, and therefore have surpluses for exportation, we pointed to Russia as the great rival of the United States in supplying the grain markets of the world. Subsequent information which we have been able to obtain assures us that our conviction of this fact, expressed a year ago, is well founded. It being always the best policy to look our rivals, as well as enemies, full in the face, we hold it to be our duty to lay before the country all the information which we can obtain respecting this subject, that our farmers may see what competition they will be compelled to encounter, in order that they may prepare to meet it, by cheaper

production, or by such other means as wisdom may dictate or experience suggest. We therefore present the following table, showing the amount of grain exported from the different ports of Russia in 1847:

TABLES SHOWING THE EXPORTATIONS OF THE DIFFERENT KINDS OF GRAIN FROM RUSSIA IN 1847, WHICH MAY BE RELIED ON AS CORRECT, BEING TAKEN FROM THE TABLES ISSUED BY THE GOVERNMENT.

Account of the exportation of grain from Russia, during the year 1847.

In the year 1846, so favorable for the corn trade, the exports of Russian grain were 5,510,853 chetwerts, thus subdivided:

	Chetwerts.
From the harbors of Northern Russia	1,756,826
From the harbors of Southern Russia	3,479,315
Across the frontier, and down the Niemen	274,712
Total	5,510,853

The following tables exhibit the comparative exports of the year 1847, and how much it has increased:

Exports from the harbors of northern Russia in 1847.

	Wheat.	Rye.	Barley.	Oats.	Maize.	Flour.
St. Petersburg	526,004	687,508	....	380,692	....	450,000
Riga	95,954	695,811	84,468	557,845	....	....
Archangel	63,608	340,109	27,688	455,636	26,454	30,576
Peruan	....	30,832	12,268	7,862	....	....
Total chetwerts.	685,566	1,751,260	121,424	1,402,035	26,454	480,576

A total of all combined, 4,473,315 chetwerts.

Exports from the harbors of southern Russia in 1847.

	Wheat.	Rye.	Barley.	Oats.	Maize.	Flour.
Odessa	2,798,183	333,876	22,306	22,481	38,070	23,610
Taganrog	808,297	17,022	1,200	....	....	449
Rostoff	328,709	20,455	....	....	....	....
Mariopel	466,992	....	....	....	....	....
Berdianski	474,949	33,675	6,200	....	....	....
Kertch	12,254	....	....	....	....	230
Fodosia	80,426	88,300	30,032	....	....	....
Eupaloria	71,000	....	....	....	....	....
	5,040,810	493,323	59,738	22,481	38,070	24,289

	Chetwerts.
Or total of all combined	5,678,721
And, adding for the harbor of Ismail (the retnrn of the exports of which have not yet been given,) the result of 1846	130,000
Total from the southern ports	5,808,721

Consequently, the exports of grain from Russia in the year 1847, are as follow:

	Chetwerts.
From the ports of the north	4,473,315
From the ports of the south	5,808,721
Across the frontier and the Niemen	300,000
Total exports from Russia	10,582,036

Thus, whilst the exports of 1847 have doubled those of 1846, more has been exported from the south of Russia during 1847 than from the whole of Russia in 1846. Such an enormous increase of exportation will not surprise when it is considered that Russia, after a good harvest, is in a condition to export about 30,000,000 of chetwerts of grain of its produce over and above that required for consumption, whereas the exports of 1847 reached only one-third of this quantity.

The following table, for which we are indebted to the London Mark Lane Express, also shows the quantity of wheat exported from Odessa, the great corn mart of Russia; and the quantity imported into England from that port during the last eleven years.

Table showing the exportation of wheat from Odessa for the last eleven years.

Exportation from Odessa in—	Chetwerts.	Of which were cleared direct for Great Britain in—	Chetwerts.
1838	991,661	1838	321,307
1839	1,210,232	1839	266,796
1840	789,007	1840	493,998
1841	720,372	1841	300,192
1842	863,422	1842	557,627
1843	1,170,245	1843	338,428
1844	1,315,300	1844	383.199
1845	1,981,930	1845	195,278
1846	2,124,385	1846	375,209
1847	2,775,837	1847	373,827
1848	2,059,097	1848	*897,904

The stock on hand, on the 31st December, 1846, was about 800,000 chetwerts; ditto, 1847, about 700,000 chetwerts; ditto, 1848, about 615,900 chetwerts; and it is reported that Odessa will henceforth be able to supply $2\frac{1}{2}$ millions chetwerts, or about 1,800,000 quarters—equal to about 14,400,000 bushels.

A chetwert is equal to about six bushels.

From the preceding table it will be seen, that, of the large quantity of wheat exported from Odessa, but comparatively a small portion is exported to England. It must, therefore, go to other countries—probably to countries on the Mediterranean.

Besides, it should be borne in mind that the quality of wheat exported from Odessa is not so good as that which is raised in the other parts of Europe and in the United States. We observe in the current prices of wheat quoted in the Mark Lane Express, of February 19, 1849, Odessa wheat is quoted at 42*s*. to 46*s*. per quarter. Other Black Sea wheat at 38*s*. to 44*s*.; while American wheat is quoted at 46*s*. to 52*s*. per quarter. Another advantage

* Probably 397,904 chetwerts.

which the American wheat grower has over the wheat grower of Odessa, is the heavy freight from the latter place, and the risks of the voyage; which it requires forty days to make. Therefore, notwithstanding the formidable surplus of grain of all kinds which Russia produces for exportation, we believe it to be in the power of the American wheat grower to command, to a great extent, the English market.

We have noticed recently a paragraph in many of the public journals of this country, to the effect that Dantzic is the great grain mart with which the farmers of this country must compete; that the average price of wheat in Dantzic, based on the experience of twenty years, is one dollar per bushel, and the freight to England 6d., or about 12 cents.

We believe there is some mistake in these statements. In a table published in MacGregor's Commercial Statistics, vol. 2, p. 738, we find the surplus for exportation from the port of Dantzic, put down at 315,000 quarters, or 2,520,000 bushels. The price in Dantzic is stated at 40s. per quarter, or nearly $1 25 per bushel; freight to England 3s. 9d. per quarter—thus making the aggregate cost in England 43s. 9d. per quarter, or $1 32½ cents. The American wheat farmer can put his wheat down upon the wharves of Liverpool at as low a price as the grain can be imported from Dantzic.

Hamburg is a more dangerous rival than Dantzic. It is one of the great depots of corn in northern Europe. It can export, according to MacGregor, 538,000 quarters, or 4,304,000 bushels, which costs in England, freight included, $1 34½. The quality of the grain is as good as that exported from Dantzic, if not better.

In relation to Dantzic, McCulloch, in his Gazetteer, has the following paragraph:

"During the period from 1770 to 1819, the average price of wheat at Dantzic was 52s. 4d. per quarter. The demand was very limited from 1820 to 1829, and the price proportionally low. The same cause reduced the price from 1832 to 1837; but whenever there is any considerable demand for Dantzic wheat, as, for instance, 150,000 quarters and upwards, the price invariably amount to from 40s. to 50s. or 55s. a quarter. We incline to think that from 40s. to 45s. a quarter would be about the average price of wheat in Dantzic in ordinary years, were the British ports always open, under a fixed duty of 5s. or 6s. a quarter. It is, at all events, abundantly certain that its price could not be under 40s. per quarter. But, taking it only at 38s., if we add to this 10s. or 12s. as the cost of conveying a quarter of wheat from Dantzic to London and putting it into granary there, including insurance and profit, and 5s. or 6s. duty, it is immediately seen that it is the greatest imaginable error to suppose that our agriculturists should be sensibly injured by the importation of Dantzic wheat. Under the circumstances supposed, it could not in ordinary years be offered for sale in this country for less than from 55s. 58s. per quarter, a price more than sufficient to insure the continual progress of British agriculture."—*McCulloch's Universal Gazetteer, vol. 1, article, Dantzic.*

That McCulloch is correct with regard to Dantzic wheat, the prices in London show conclusively. The prices of Dantzic wheat, quoted in the Mark Lane Express, of February 19, 1849, are from 48s. to 52s. per quarter. The duty having been taken off, the prices are of course a little lower than they would have been if the wheat had been subjected to duty. These facts utterly disprove the statement that the price of wheat in Dantzic, "based upon 20 years' experience," is $1 per bushel, and the transportation to London 12 cents, making the cost in London only $1 12.

We give the following tables, showing the production of certain crops in Great Britain and France at different periods, believing them to contain matter interesting to the farmers of this country, and not inappropriate in this place.

TABLE.

Exhibiting the quantity of land cultivated and the quantity of grain produced in the United Kingdom in 1835.

	Acres.	Product per acre, quart's	Quantity in quarters.	Quantity in bushels.
Wheat	5,000,000	4	20,000,000	160,000,000
Barley	2,000,000	5	10,000,000	80,000,000
Oats, &c	8,000,000	6	44,000,000	352,000,000
Total acres	15,000,000	Total grain	74,000,000	592,000,000

France.

The waste lands of France, in 1826, were one-twelfth part of the whole surface, or ten millions of acres. They have been reduced to near five millions of acres by the steady improvement in agricultural operations. The arable land in that year was equal to fifty-seven millions of acres. It has been increased by the recovery of waste lands, and by encroachments upon the forests, to near seventy millions of acres.

The progress of France in agriculture is exhibited in the following

TABLE

Showing the products of the soil of that republic in 1826 *and* 1847.

Products.	1826.	1847.
Wheat	166,400,000	250,500,000
Rye	101,600,000	162,000,000
Maslin	83,200,000	127,300,000
Indian corn	17,280,000	33,400,000
Buckwheat	23,200,000	32,200,000
Oats	88,000,000	155,230,000
Potatoe	23,200,000	41,700,000

Total exports to Great Britain and Ireland of the following articles, from the ports of New York, New Orleans, Philadelphia, and Baltimore, from September 1 to February 28 in each year.

Articles.	1846-'47.	1847-'48.	1848-'49.
Flour..........barrels......	991,783	215,230	758,423
Meal..........do........	153,968	71,844	47,545
Wheat..........bushels......	1,222,027	182,911	970,970
Corn..........do........	4,380,745	1,172,664	5,049,376
Hams and bacon..........pounds......	3,360,811	6,877,924	18,599,003
Beef..........barrels......	31,358	16,698	50,239
Lard..........pounds......	7,002,760	5,441,761	8,094,013
Pork..........barrels......	31,146	8,999	27,897

An account of the corn, meal, and flour imported into Great Britain, in each year, from January 1, 1815, to 1848.

Years.	Imported from Ireland.	Imported from the British N. American colonies.	Imported from all other parts.	Total imported.
	Quarters.	*Quarters.*	*Quarters.*	*Quarters.*
1815............	821,192	25	333,041	1,154,258
1816............	873,865	3	319,203	1,193,071
1817............	695,651	25,877	1,775,353	2,496,881
1818............	1,204,733	56,618	3,474,051	4,735,402
1819............	967,680	14,257	1,693,255	2,675,192
1820............	1,415,722	40,897	1,300,953	2,757,572
1821............	1,822,816	40,916	216,738	2,080,470
1822............	1,063,089	23,439	102,365	1,188,893
1823............	1,528,153	209	53,432	1,581,794
1824............	1,634,000	891	609,147	2,244,038
1825............	2,203,962	95,059	962,718	3,261,739
1826............	1,693,392	30,500	2,218,830	3,942,722
1827............	2,828,460	61,035	2,550,310	5,439,805
1828............	2,826,590	21,600	1,272,396	4,120,586
1829............	2,307,244	7,335	2,680,414	4,994,993
1830............	2,215,521	79,634	2,355,412	4,650,567
1831............	2,429,182	225,240	3,316,760	5,971,182
1832............	2,990,767	129,476	668,422	3,788,665
1833............	2,737,441	117,745	366,524	3,191,710
1834............	2,792,658	66,829	492,071	3,351,558
1835............	2,679,438	25,[illegible]16	296,189	3,000,643
1836............	2,958,272	18,[illegible]1	625,032	3,601,865
1837............	3,030,293	19,060	1,306,870	4,356,223
1838............	3,474,302	19,479	1,515,250	5,009,031
1839............	2,243,151	17,438	4,573,660	6,834,249
1840............	2,327,782	178,828	3,811,694	6,318,304
1841............	2,855,525	308,382	3,378,599	6,542,506
1842............	2,083,600	247,127	3,475,970	5,806,697
1843............	2,721,400	146,647	1,299,766	4,167,823
1844............	2,460,800	297,936	2,794,357	5,583,083
1845............	2,992,800	312,438	2,118,707	5,423,945
1846............	1,625,000	431,075	4,180,302	6,536,777
1847............	879,900	546,431	11,769,728	13,196,059
1848............	....	229,313	7,125,688	

Latest quotations, per imperial quarter, for wheat, at various points.

Places.	1847.			1848.		
	s. d.		s. d.	s. d.		s. d.
Dantzic	40 0	a	44 0	39 0	a	42 0
Do (high mixed)	46 0	a	48 0	43 0	a	44 0
Leghorn	44 0	a	47 0	39 6	a	42 6
Rostock	40 0	a	43 0	36 0	a	39 0
Trieste	33 6	a	42 0	37 0	a	38 0
Hamburgh	41 0	a	43 0	40 0	a	43 0
Petersburgh	40 0	a	44 0	37 11	a	39 3
Genoa	46 6	a	49 6	38 9	a	46 0
Naples	35 0	a	37 3	38 0	a	44 0
Konigsberg	41 0	a	42 0	37 6	a	42 6
Bordeaux	57 0	a	55 0	39 0	a	40 0
Marseilles	39 0	a	46 0	37 0	a	38 6
Nantes	46 0	a	49 0	37 0	a	38 6
Odessa	31 10	a	33 2	30 0	a	32 9
Ancona	42 6	a	43 0	39 6	a	40 6
Stettin	42 0	a	43 0	36 0	a	39 0
Bilboa	56 0	a	62 0	44 0	a	52 0
Galatz	27 0	a	31 0	20 0	a	23 6
New York	44 0	a	47 0	40 0	a	44 0
Philadelphia	42 0	a	46 0	40 0	a	41 0
Montreal	32 0	a	39 0	37 0	a	37 6
Paris	54 0	a	55 0	38 0	a	44 0
Taganrog	30 6	a	34 6	20 6	a	30 0
Alexandria	20 0	a	24 0	18 6	a	19 4
Constantinople	36 0	a	39 0	27 0	a	33 0

Average prices, per imperial quarter, in England and Wales, for twenty-five years, ending 1848.

Years.	Wheat.	Barley.	Oats.	Beans.	Peas.
	s. d.	s. d.	s. d.	s. d.	s. d.
1824	64 0	36 5	24 10	40 10	40 8
1825	68 7	40 1	25 8	42 10	45 5
1826	58 9	34 5	26 9	44 3	47 8
1827	56 9	36 6	27 4	47 7	47 7
1828	60 5	32 10	22 6	38 4	40 6
1829	66 3	32 6	22 9	36 8	36 8
1830	64 3	32 7	24 5	36 1	39 2
1831	66 4	38 0	25 4	39 10	41 11
1832	58 8	33 1	20 5	36 5	37 0
1833	52 11	27 6	18 5	35 1	37 0
1834	46 2	29 0	20 11	36 7	33 0
1835	39 4	29 11	22 0	30 0	30 3
1836	48 9	33 2	23 1	38 4	37 3
1837	55 10	30 4	23 1	38 7	37 9
1838	64 4	31 5	22 5	37 4	36 8
1839	70 6	39 1	26 6	41 2	41 1
1840	66 4	36 3	25 9	43 6	42 5
1841	64 5	33 0	22 5	39 1	40 5
1842	57 5	27 6	19 3	32 8	32 11
1843	50 2	29 5	18 3	29 1	31 1
1844	51 3	33 7	20 7	31 6	33 5
1845	50 9	31 8	22 6	39 0	38 6
1846	54 9	32 9	23 8	39 0	39 0
1847	69 5	43 11	28 7	50 1	51 5
1848	50 6	31 6	20 6	36 9	39 1

Account of the foreign corn, grain, meal, and flour imported into Great Britain and Ireland in the years 1827 *to* 1848.

Years.	Wheat.*	Barley.	Oats.	Beans.	Peas.	Rye.	Buckwheat.	Indian corn.	Wheat, meal, and flour.	Total imported.
	Quarters.	*Quarters.*	*Quarters.*	*Quarters.*	*Quarters.*	*Quarters.*	*Quarters.*	*Quarters.*	*Cwts.=112lbs.*	*Quarters.*
1827..........	283,236	208,117	1,741,091	142,726	34,694	30,313	9,392	154,097	94,348	2,630,083
1828..........	715,242	168,673	166,423	73,370	52,928	29,562	29,036	19,649	151,038	1,297,175
1829..........	1,544,969	305,798	541,858	46,487	40,412	67,392	18,400	27,622	461,895	2,721,668
1830..........	1,414,262	132,210	499,947	16,909	34,572	41,784	....	1,031	560,249	2,274,440
1831..........	1,857,278	369,032	617,568	22,345	59,507	93,006	6,521	59,239	1,627,742	3,054,661
1832..........	405,884	101,810	31,862	27,914	20,198	4,645	....	1,582	224,068	656,625
1833..........	247,625	85,221	23,335	22,857	15,890	3,370	33	7	170,092	445,714
1834..........	131,566	88,562	175,276	47,756	67,880	10	1	227	149,554	550,618
1835..........	46,530	67,796	117,673	34,380	24,216	21	210	1,808	84,684	316,344
1836..........	162,778	83,483	129,625	93,056	78,299	6,626	440	1,006	279,602	632,362
1837..........	452,369	87,791	413,710	105,671	111,264	30,711	471	4,026	346,325	1,327,984
1838..........	1,240,138	2,203	50,981	64,358	29,848	1,781	....	4,043	439,910	1,516,527
1839..........	2,638,593	579,405	674,554	109,810	140,012	153,673	1,936	9,565	793,606	4,529,747
1840..........	1,995,453	625,437	537,805	129,418	158,486	3,332	765	22,021	1,552,697	3,907,271
1841..........	2,409,754	264,654	122,297	293,689	148,564	15,600	3	4,137	1,275,656	3,615,648
1842..........	2,722,305	73,550	302,852	126,591	93,239	13,823	9	35,866	1,151,827	3,690,788
1843..........	932,866	179,414	84,718	48,080	48,971	4,872	....	516	440,955	1,423,904
1844..........	1,097,963	1,025,416	308,126	153,724	108,056	26,594	3,935	39,218	987,774	3,039,608
1845..........	844,533	367,854	586,860	185,008	80,613	435	1,771	55,984	924,256	2,381,850
1846..........	1,437,336	371,137	794,863	255,521	212,529	1,688	22,849	694,184	3,363,810	4,731,974
1847..........	2,650,058	772,840	1,706,780	443,719	157,245	68,817	22,938	3,614,637	8,637,377	11,852,000
1848..........	2,477,366	977,203	930,265	480,706	187,454	59,825	205	1.577.023	1,731.974	7,174,999

Liverpool imports of North American produce, from January 1 to December 31 in each year.

Years.	Bacon.	Beef.		Pork.	Cheese.		Tallow.		Lard.		Indian corn.	Wheat.	Flour.	Ind. meal.
	Cwt. of 112 lbs.	Tierces.	Barrels.	Barrels.	Casks.	Boxes.	Hhds.	Barrels.	Barrels.	Kegs.	Quarters.	Quarters.	Barrels.	Barrels.
1843	....	5,300	2,856	1,749	4,500	19,093	2,685	1,996	23,550	20,706	....	13,256	100,322	....
1844	....	9,912	9,186	7,689	5,287	18,245	3,471	2,605	19,393	29,795	....	23,073	346,568	....
1845	....	15,171	3,487	7,913	5,322	43,984	3,520	3,619	10,471	54,292	....	41,895	363,402	....
1846	....	26,251	9,305	15,154	4,289	63,113	3,537	5,030	20,879	65,451	200,000	194,603	1,184,012	....
1847	50,319	15,402	3,172	27,356	6,716	52,822	2,118	3,914	33,725	52,166	1,060,843	291,675	2,184,922	430,534
1848	131,937	15,424	2,585	30,530	6,292	113,281	4,016	2,875	89,611	78,037	748,292	116,583	691,372	105,937

TABLE

Exhibiting an estimate of the products of labor and capital in the United States for the year 1848.

Articles.	Quantities.	Prices.	Value.	Total value.
Agricultural products.	*Bushels.*	*Dollars.*	*Dollars.*	*Do lars.*
Wheat (*a*)	126,364,600	1 15	145,319,290	
Indian corn	583,150,000	59	344,058 500	
Barley	6,222,050	65	4,044,332	
Rye	32,951,500	65	21,418,475	
Oats	185,500,000	35	64,925,000	
Buckwheat	12,523,000	50	6,266,500	
Patatoes	114,475,000	30	32,342,500	
Beans (*b*)	10,000,000	1 00	10,000,000	
Peas (*b*)	20,000,600	87½	17,500,000	
Flax seed	1,600,000	1 20	1,920,000	
	Tons.			
Hay	15,735,000	8 00	125,880,000	
Hemp and flax	100,000	180 00	18,000,000	
	Pounds.			
Tobacco (*c*)	218,909,000	04	8,756,360	
Cotton	1,066,000,000	07	74,620,000	
Rice	119,199,500	03	3,575,985	
Sugar (including maple)	275,000,000	05	13,750,000	
Silk cocoons	400,000	2 00	800,000	
Hops	1,566,301	09	140,967	
Beeswax (*d*)	789,525	21	165,800	
Honey	23,685,750	10	2,368,575	
	Gallons.			
Molasses (*e*)	9,600,000	28½	2,736,000	
Wine (*f*)	500,000	1 00	500,000	
Pasturage (*g*) annual value			60,768,136	
Value of the *residuum* of crops: straw, chaff, &c. (*h*)			100,000,000	
Manure (*i*)			60,000,000	
				1,119,866,420
Products of orchards.	*Dollars.*			
Value in 1840	7,256,904			
Increase 25 per cent	1,814,226		9,071,130	
Products of gardens. (*j.*)	*Annual value, estimated at $15 per garden.*			
Number estimated at 3,000,000			45,000,000	
Products of nurseries.				
Value of in 1840	593,534			
Increase 25 per cent	148,383		741,917	
				54,813,047
Live stock and its products.				
Sheep, number in 1848 (*k*)	25,000,000			
Wool, pounds	60,000,000	30	18,000,000	
Neat cattle, number in 1848 (*l*)	18,714,482			
Swine, number in 1848 (*m*)	35,000,000			
Butchers' meat, (*n*,) including mutton, beef, and pork, lbs.	3,664,934,000	04	146,597,360	
Value of hides, pelts, and tallow			20,000,000	

TABLE—Continued.

Articles.	Quantities.	Prices.	Value.	Total value.
	Bushels.	*Dollars.*	*Dollars.*	*Dollars.*
Increase of neat cattle in 1848, estimated at 3 per cent. since 1847, in number 449,147, at $10 per head..............	....	....	4,401,470	
Horses, mules, and asses. (o.)				
Number in 1848..............	5,419,586			
Value of increase (labor not estimated)................	....	....	8,129,350	
Poultry.				
Value in 1840................	9,344,410			
Increase 25 per cent..........	2,336,102	....	11,680,512	
Eggs (*p*) number consumed...	1,084,300,000	half cent	5,421,500	
Live geese feathers, (*q*,) lbs...	2,000,000	50	1,000,000	
Products of the dairy. (r.)				
Value in 1840................	33,787,008			
Increase 25 per cent..........	8,446,750	....	42,233,758	
Milk, value of................	20,000,000	....	20,000,000	
				277,553,950
Products of the forest.. (s) including lumber, furs, and skins......................	....	....	22,250,000	
Fire wood, number of cords...	25,000,000	1 50	37,500,000	59,750,000
Products of the fisheries, (t,) including whale, cod, mackerel and all other fisheries....	....	....	....	17,581,339
Capital employed in commerce, trade, and internal transportation, (u)	400,000,000			
Profits at 6 per cent..........	....	....	....	24,000,000
Manufactures. (v.)				
Products, value of...........	....	....	....	550,000,000
Mines. (w.)				
Products of, including iron, lead, gold, silver, marble, granite, salt, coal, &c., &c.	....	....	....	75,000,000
Banking and insurance. (x.)				
Bank capital..................	212,000,000			
Capital of insurance companies				
Profits of....................	....	....	....	20,000,000
Money loaned at interest.				
Profits of....................	....	....	....	20,000,000
Rentals.				
Of houses and lands	....	....	....	50,000,000
Professions.				
Profits of....................	....	....	....	50,000,000
				2,323,564,756

GENERAL OBSERVATIONS ON THE FOREGOING TABLE.

In the report of 1847, a table like the present was embraced, exhibiting an estimate of the value of the products of labor and capital in the United States for that year, upon the following basis, viz: the amount of the articles embraced in the table, as given by the census of 1840, was assumed as the basis of the estimate, and 22 per cent. was added to that sum, which is the ratio of the increase of population since the taking of that census; it being reasonable to suppose that the value of the industry and capital of the Union increases in the same ratio as the population. The same basis is assumed for the estimates of the products of the labor and capital of the United States for 1848.

Political economists assume that the labor and capital of a State, without regard to age, sex, or condition, (an assumption which may not be precisely true,) indicate, more truly than any other bases of calculation, its productive power. *See the Madison Papers, pp.* 28 *to* 30.

(*a*) The prices of wheat, and the other grains, and also of hemp and flax, tobacco, cotton, rice, sugar, hops, beeswax, honey, and molasses, included in this table, are generally the medium prices of those articles, as quoted in the prices current of the New York market, published in the New York "*Shipping and Commercial List*" of February 17, 1849.

(*b*) In the table for 1847, the quantity of beans produced in the United States was estimated at 25,000,000 bushels, and peas also at 25,000,000 bushels. Subsequent information has satisfied us that those estimates are too high. The present estimates of these articles are deemed a nearer approximation to the truth, and not very far from the quantities actually produced.

(*c*) The estimates of the quantities and values of hemp, flax, hops, beeswax, molasses, wine, products of orchards, and nurseries, are based upon the census of 1840, allowing 25 per cent. for increase, except when later information justifies a departure from this rule.

(*d*) The census of 1840, contains no returns of honey. Bevan, in his work on the honey bee, estimates 30 pounds of honey for each pound of wax produced. On that basis we have made our estimate.

(*e*) A little more than 45 gallons of molasses are allowed by authors treating on the subject of sugar-growing and manufacture for every 1,000 pounds of cane sugar.

(*f*) The quantity of wine manufactured in the United States in 1840, was 124,734 gallons. This of course included all kinds, as well that manufactured from currants as that made from grapes. Since then the production of wine from grapes has considerably increased. Extensive vineyards are now in existence in the neighborhood of Cincinnati, which had not been planted in 1810. The wine culture has extended in other States, and we think we under estimate the quantity produced when we fix it at 500,000 gallons of all kinds.

(*g*) In our table for 1847, we estimated the value of pasturage, including ordinary, and that of fields from which crops had been taken, at $27,500,000. We are convinced that that sum is greatly lower than its real value. We now estimate it at $60,768,136. The following are the *data* from which we derive our estimates:

Number of animals.		Value of pasturage per head.	Total value of pasturage.
Sheep	25,000,000	$ 50	$12,500,000
Neat cattle	18,714,482	2 00	37,428,964
Horses, mules, &c	5,419,586	2 00	10,839,172
			$60,768,136

(*h*) In our table for 1847, we estimated the value of the *residuum* of crops at $74,000,000. Our estimate was made from a comparison of the estimates for other countries, particularly for France, in which 11½ per cent. upon the value of the products of the land and forest is allowed for the refuse of crops, and from the limited information derived from practical farmers in this country. Its accuracy has been called in question, and the sum at which we placed it considered not only too high, but greatly erroneous. Fortunately, however, in our last circular, issued for the collection of agricultural statistics, this very matter was made the subject of particular inquiry, and the result was, a large variety of returns and estimates from practical farmers in almost every State and locality in the Union. These returns have been condensed into a table, which appears in another part of this report, and to which the reader is respectfully referred for a great variety of valuable and interesting facts. Those returns more than sustain our estimate for 1847, and justify us in adding to the amount. Although many of the returns go much higher, we have taken those upon which we believe full reliance may be placed. Many of the returns allow one ton of straw to every 20 bushels of English grain produced, and one ton of fodder for every 20 bushels of Indian corn. Some place the ratio of straw and fodder to the grain above, and others below those just stated. We have allowed one ton of straw to every 20 bushels of English grain, and one ton of fodder to every 25 bushels of corn. The former we have valued at $2 50 per ton, and the latter at $2—prices which we think below the average of the returns. According to our estimate, in the table preceding the agricultural report, the whole quantity of wheat, barley, rye, oats, &c., produced is 363,576,150 bushels. Allowing one ton of straw for every 20 bushels, we have 18,178,802 tons of straw; which, at $2 50 per ton, amounts to $45,-346,005. The quantity of corn produced is estimated at 583,150,000 bushels. Allowing one ton of fodder for every 25 bushels, we have 23,326,000; which, at $2 per ton, amounts to $46,652,000—in the whole, to $91,998,005. If we add the *refuse* of the cotton, sugar, rice, and other crops not so important, it will more than exceed $100,000,000—the sum we have assumed in our table. In

England, the value of straw used annually for thatch, &c., is estimated at 8,000,000 pounds sterling, or about $40,000,000. (*See McQueen's Statistics, p.* 79.)

(*i*) The item of manure was omitted in our table of 1847. It is, however, an article of great value, and worthy of a place among the estimates of the products of a country. According to Marshall's Rural Economy, each head of cattle requires 10,950 pounds =100 cwt. of 110 pounds of dry clover annually as food, and each ox, or cattle, while fattening, "will yield annually 16 full double loads of dung." According to McQueen four sheep are equal to one cow, as to food; and six sheep may be taken as equal to one ox. After citing various data, McQueen concludes the average of all was "above 13 cart loads, or square yards [cubic yards?] for each cow, from the 1st of November to the 1st of May, during that period of the year when cattle are considered to be almost wholly in the house." He also says "that there is little difference in the quantity of dung produced by the cow and the horse." Taking the number of cattle, horses, &c., in the United States as stated in the table, and making a proper allowance for the sheep, we have equal to 32,384,068 cows as the basis of our estimate. Assuming that they produce as much manure as McQueen estimates, the quantity produced would be 420,992,884 cubic yards, or about 90,000,000 cords, as it is measured in many of the northern States. In the New England States, it is valued at from $1 50 to $1 75 per cord, and in the neighborhood of large cities much higher. In other parts of the Union it is esteemed of no value. We have, allowed $60,000,000 as the total value, being 66⅔ cents per cord. McQueen, estimates the quantity of manure produced by the cattle, horses, sheep, pigs, poultry, &c., produced in Great Britain, in 1835, at 329,300,000 loads, valued at £59,860,000, or about $295,000,000, "exclusive of the quantity dropped by cattle, &c., on land during the summer, autumn, &c., perhaps one-third or more." He adds in a note: "An intelligent agricultural proprietor in Scotland informed me that he had ascertained that this latter quantity [namely, the manure dropped] to be 2¾ tons for each cow. The value of animal manure alone, applied to the land yearly thus, greatly exceeds the whole foreign trade of the country." (*See McQueen's Statistics, pp.* 50 *and* 51.

(*j*) In the United States, particularly in the country, every family has a garden. It is believed that three gardens to every four families will not be an unreasonable allowance for the number, and fifteen dollars per garden for the value of the products. McQueen estimates the value of the vegetables and fruits in Great Britain and Ireland, in 1835, at £16,000,000, or nearly eighty millions of dollars. The value of the products of the orchards and gardens in this country must be equal to five-eighths as much.

(*k*) In our table for 1847, we estimated the number of sheep of all kinds in the United States at 25,000,000. We think accurate returns would show a still greater number. In the celebrated report of the Harrisburg Convention, in 1827, the number of sheep in the United States was estimated at 30,000,000. This number, at

that time, was in all probability too large. The census returns give 19,311,374 in 1840; this number we think was too low for that time. And 25,000,000 at this time is probably less than the real number now in the country; and as there has been little or no increase during the last year, in consequence of the depressed state of the wool growing interest, we have concluded to take our estimate for 1847 as the nearest approximation to the true number for 1848, and therefore estimate the number of sheep now in the United States at 25,000,000.

(*l*) The number of neat cattle in the United States in 1840, according to the census returns, was.................... 14,971,586
Increase since then estimated at 25 per cent......... 3,742,896

18,714,482

(*m*) In our table for 1847, for reasons then given, we estimated the number of swine in the United States at 35,000,000. The returns of the "hog crop" of the western States show a little falling off for the present year. We, however, believe that there has been no diminution of the number of swine raised, and therefore adhere to our estimate for 1847.

(*n*) Butcher's meat is an item which was not included in our estimate for 1847. As the amount consumed during the year must be produced in addition to the yearly increase of the flocks and herds of sheep, cattle and swine, it forms a very proper and a very important item in an estimate of the production of a nation. In our circular, issued during the last year, particular inquiry was made in reference to this subject, and a variety of statements and estimates were received in the answers returned, and which will be found embodied in a condensed form in another paper annexed to the agricultural report. We give a few of the estimates of our correspondents in this paper.

In New Hampshire, one return allows 20 pounds of beef and 25 pounds of pork to each person; in New York, 150 pounds of beef; in New Jersey, 100 pounds of beef and 100 pounds of pork; in Pennsylvania, in one estimate, 100 pounds of beef and 100 pounds of pork—in another, 180 pounds of animal food for each person over ten years of age; in another estimate, 100 pounds of beef; and in another, 60 pounds do. In Virginia, 250 pounds bacon; in South Carolina, 150 pounds pork and 50 pounds beef; in Georgia, 180 pounds pork and 50 pounds beef; in Mississippi, beef or pork, 200 to 250 pounds; in Tennessee, 100 pounds of beef, pork and poultry; in Kentucky, 200 pounds beef, or 150 pounds pork; in Indiana, consumption, including adults and children, 15 pounds beef, 100 pounds pork, each person—another estimate, 50 pounds beef, 150 pounds pork; in Illinois, 200 pounds beef and pork.

In England, McQueen takes the consumption of the large cities of London, Birmingham, Manchester, Glasgow, Dundee, &c., &c., as the basis of calculation for the British empire, from which he shows that the consumption of animal food of all kinds, including swine's flesh, amounts to 169 pounds per individual. Where animal food is so abundant that every individual can have as much as

he wants of it, it cannot be supposed that the consumption is less per individual than in Great Britain. But, to be on the safe side, we have estimated the same quantity per head (namely, 169) for the consumption of butcher's meat and swine's flesh by the people of this country. This gives upon our estimate of the population for 1848 the enormous quantity of 3,664,934,000 pounds, which, at four cents per pound, amounts in value to the sum of $146,597,360. McQueen (pp 23, 42, 43 and 56) estimates the quantity of butcher's meat consumed by the people of Great Britain at 2,871,749,790 pounds—to which is to be added 6,080,000 swine, averaging in weight 1 cwt. 3 quarters, or 196 pounds=1,191,680,000 pounds; thus giving 4,063,429,790 pounds as the quantity of animal food consumed in 1835 by the people of Great Britain and Ireland, then numbering 24,000,000 souls. The value of butcher's meat is estimated at £58,283,759; value of swine, at £21,000,000—equal to £79,283,759, or about $395,000,000. This is exclusive of hides and tallow; the latter he estimates at £4,500,000, or about $22,000,000. In view of these facts, we believe our estimate of the consumption of animal food in this country is not too great, enormous as it may appear in the aggregate.

(*o*) Horses, in 1840	4,335,669
Increase, 25 per cent	1,083,917
	5,419,586

An increase of three per cent. per annum gives 162,586 animals, worth $50 per head.

(*p*) In the "*Journal d'Agriculture Pratique et de Jardinage*," it is estimated that each of the inhabitants of the city of Paris consumes 138 eggs per annum. It is probably very much above the aggregate number consumed. We have in our estimate allowed 50 eggs for the consumption of each individual of the population of the United States per annum, and estimated their value at half a cent each egg. The number of eggs imported from France for London alone, in 1833, was upwards of 70,000,000. The domestic supply was, of course, immensely greater.

(*q*) Of the quantity of feathers produced in the United States, we have no information. We put the item in because it exists, hoping hereafter to obtain satisfactory information in relation to it.

(*r*) We are unable to say whether or not the item of milk consumed, exclusive of the quantity used in manufacture of butter and cheese, was included in the census of 1840, under the head "products of the dairy." We are inclined to think it was not, as the value of the products of the dairy is very low in proportion to the population of the Union, by comparison with the estimates for other countries.

In 1840, the population of the Union exceeded 17,000,000; therefore, according to the census returns, the consumption and exportation of the products of the dairy would not be quite $2 per head. We are, therefore, inclined to think that milk was not included in the returns. If so, we might with propriety add $15,000,000 to our estimate of the products of the dairy. In Great Britain, ac-

cording to McQueen, the value of the milk butter, and cheese consumed in 1835 was, milk, £12,000,000; butter, £13,500,000; cheese, £7,000,000—total, £32,500,000, or $160,000,000 in federal money. In our belief, the value of the products of the dairy consumed in the United States and exported, is nearer $100,000,000 than $42,000,000.

(*s*) Estimate based upon the census of 1840, with 25 per cent. added.

(*t*) Returns of the census of 1840, with 25 per cent. added.

(*u*) Estimate based upon the census of 1840, with due allowance for increase and decrease of the different interests.

(*v*) In consequence of the embarrassments experienced by the commercial world during the year 1848, we have estimated the capital employed in manufactures at the same amount as last year. Our estimate for 1847 was founded upon the aggregate capital returned in 1840, with a little more than 22 per cent. added for increase.

(*w*) For reasons like those stated in the preceding paragraph, we have made but little addition to our estimate of the products of the mines in our table of 1847.

(*x*) The last four items are crude estimates, there being no satistory data on which to found them. In Great Britain, the rental of houses and lands amounts to £65,000,000, or $315,000,000.

There are in the United States, probably, 10,000 lawyers; 15,000 physicians and surgeons; 20,000 clergymen of all sects and religions; besides authors, editors, professors of science, belles lettres, arts, and music; clerks, school teachers, &c., &c. But there are no returns or other satisfactory data from which their incomes can be calculated.

Thus it appears that the aggregate amount of the products of labor and capital in the United States, in 1848, was $2,323,564,765, if the estimates in the preceding table are correct. It is proper, however, to remark that, in the census of 1840, among the statistics of manufactures, the following items appear, viz: mills, and articles produced $76,545,453; houses, $41,917,401; ships, $7,016,094; manufactures of cotton, $46,350,453; manufactures of wool, $20,696,999; household goods, $29,025,380. From the items enumerated, it is apparent that a large portion of the aggregate value of manufactures produced in the United States consists of raw material, which has been included in the census statistics, as well as in our estimates in other forms, and therefore should be deducted from the aggregate amount. In England, the value of raw material to products in manufactures is usually estimated at three fifths of the whole. In this country, where labor is higher, and materials cheaper, it would be nearer to the truth to estimate the cost of the raw material at one half of the value of the products of manufactures—the other half representing the wages of labor and the profits of capital. Having been estimated in other forms, it is proper that the cost of the raw material should be deducted from the aggregate amount. One-half would be $275,000,000; thus show-

ing the grand aggregate of the products of the labor and capital of the United States, in 1847, to be $2,048,564,756.

Perhaps other deductions and allowances of a similar character should be made, and very probably some additions. Precise accuracy is not pretended in the estimates above submitted. With the materials at hand, and within reach of this office, it could not be attained.

Our table, as was remarked in our last report, may therefore be deemed an experiment. It is hoped, however, that it will attract the attention of the intelligent investigator, and be the means of eliciting suggestions which will enable us to make a nearer approximation to truth in future estimates which we may make.

Friendly criticism will be very gratefully received, and any suggestions which will enable us to render our work more perfect, will be carefully considered. It is designed to republish the table in the reports of this office for a series of years, with such corrections and improvements as more accurate information may justify. By this method, we hope, in time, to make it as accurate and reliable as such a table can possibly be.

During the season, we have observed in the public journals criticisms upon the table published in the report for 1847; some of a friendly and liberal, and some of an unfriendly and illiberal character. We have, however, as yet seen no suggestions which should induce us materially to alter the principles upon which we have constructed the preceding table.

Some persons who have done us the honor to criticise our table, have found fault with our taking the medium market price in New York, the great commercial mart of the country, in which the general prices of all products and commodities are fixed, as the rule by which to estimate the different articles and commodities mentioned in our table. For instance, the price of wheat in the market of New York is not deemed the true price by which to estimate the value of the wheat crop of the country. But, on the contrary, the true rate, it is alleged, should be the price which the *producer* obtains in the million localities of the Union where wheat is produced and sold from first hands.

We do not admit this criticism to be founded on sound and correct principles. When we revert to first principles in political economy, we think it must be admitted that the surplus of any crop or commodity which is sold by the producer and enters into the general commerce of the world, is the only part of it which has, in truth, so far as the accumulation of wealth by the nation is concerned, any value. That portion of his own production which the farmer consumes in his family or on his farm, is of no account or value whatever in the general commerce of the world, and has, in fact, no price. It is the surplus which enters into commerce only that has price, and that only, strictly speaking, it is of importance to estimate. Therefore, to be precisely correct, the true rule would be to call the amount of wheat consumed by the producer nothing, and estimate only the amount which he has to sell.

Besides, the price is not deemed very important. It *is* impor-

tant to get the true *quantity*, and when that is obtained, we have all that is necessary. If we have produced this year 126,000,000 bushels of wheat, when we have ascertained the quantity, we have by far the most important part of the information we need on that subject, and we may put such a value, or rather price, on the whole quantity as we please. It will fill no more mouths under one principle of valuation than it will under another. We therefore have concluded to assume, as our rule of estimate in relation to the articles in our table, the medium price in the New York market at the date of preparing the table; and we have very good authority for this course. We find the same principle followed by eminent statisticians in Europe. Spachman, in his estimate of the annual produce of the United Kingdom for 1846, values wheat at 60*s*. the quarter, whereas the imperial average price per quarter was only 53*s*. 4*d*. during that year. But, if others are dissatisfied with this rule of calculation, we have, in another table in this report, supplied the means by which estimates may be made more in accordance with their own views. In appendix No. —, will be found tables exhibiting, among other things, the cost of production and the prices of the different grains in nearly every State in the Union. And in another table will also be found the prices of agricultural products of all kinds in the principal markets of nearly every State. From these tables materials can be obtained by which estimates may be made more in accordance with the views of those who differ from our principles of calculation.

We have also seen some criticisms upon our estimate of the quantities of agricultural produce. We allude more particularly to one published in a western city in relation to our estimate of the quantity of flax and hemp produced. The criticism was illiberal and arrogant, but it led us to investigation, the result of which was a thorough conviction of our own general correctness, and the want of information on the part of the person who called our estimate in question. Indeed, we think it can be clearly shown that there is more than twice as much flax produced in the single State of New York, as the person in question supposed was produced of the same article in the whole Union. We candidly admit that we are liable to great error for want of the means of obtaining correct information. But we think we can safely say that no other person has such ample means in his possession from which to make an estimate of the crops of the Union as we have. They are to be found in the facts which we carefully collect from every agricultural periodical, and many other papers, published in the different States of the Union; and from the returns made by practical farmers in answer to thousands of circulars which we send yearly into every neighborhood of the country, asking for information. Until we are provided with better means of information and more reliable data, we must adhere to the estimates which we have submitted, believing them to be as near an approximation to the actual truth as has yet been made by any one.

As a matter of curious interest, we give McQueen's estimate of the "produce of the land" in the U. Kingdom, adding a column containing the values reduced to federal money, at $4 85 per pound sterling.

Table.

	Value in pounds sterling.	Value in federal money.
Grain of all sorts	£134,000,000	$649,900,000
Potatoes	20,000,000	97,000,000
Horses, keep, &c	53,936,487	261,591,961
Cattle and sheep, butchers' meat	58,283,759	282,676,231
Swine, butchers' meat	21,000,000	101,850,000
Poultry	3,000,000	14,550,000
Milk, butter and cheese	32,500,000	157,625,000
Straw, and as thatch, &c	8,000,000	38,800,000
Manure, animal	59,860,000	290,321,000
Wool, British	13,979,166	67,798,955
Vegetables and fruits	16,000,000	77,600,000
Hops and seeds	2,000,000	9,700,000
Flax and hemp	2,500,000	12,125,000
Fisheries	12,000,000	58,200,000
Mines and minerals	33,970,276	164,755,838
Timber	3,000,000	14,550,000
Grand total	£474,029,688	$2,299,043,985

Summary of the produce of land, manufactures, &c., in Great Britain and Ireland, as estimated by McQueen. (McQueen's Statistics, p. 216.)

Produce of land	£474,029,688	$2,299,043,986
Produce from ships	44,470,961	215,684,160
Produce of manufactures	262,085,199	1,271,113,215
Produce of carriages, riding horses, &c	13,500,000	65,475,000
Grand total	£794,085,848	$3,851,316,361

In order to show that eminent writers on statistics in England may widely differ in their estimates, and also to show the difficulty of procuring satisfactory data in investigations of this kind, we give a table of the value of productions of the United Kingdom, as estimated by William F. Spachman, esquire, in 1846:

Table exhibiting an estimate of the annual produce of the land, manufactures, &c., of the United Kingdom of Great Britain and Ireland in 1846.

22,000,000 quarters of wheat, at 60*s*. per quarter	£66,000,000	$320,100,000
34,000,000 quarters of *all other grain*, at 30*s*. per quarter	51,000,000	247,350,000
Hay, seeds, garden and green crops	30,000,000	145,500,000
2,000,000 head of cattle	30,000,000	145,500,000

10,000,000 sheep and lambs...	£15,000,000	$72,750,000
Potatoes....................	25,000,000	121,250,000
Wool	8,000,000	38,800,000
Butter......................	5,000,000	24,250,000
Cheese	5,000,000	24,250,000
Poultry, milk, eggs, fruit and vegetables................	3,000,000	14,550,000
Horses, 200,000	3,000,000	14,550,000
Pigs	2,000,000	9,700,000
All other animals	1,000,000	4,850,000
Hops........................	1,500,000	7,275,000
Timber......................	2,500,000	12,125,000
Value of uncultivated wastes and woods................	2,000,000	9,700,000
	£250,000,000	$1,212,500,000
Annual value of manufactures, after deducting value of raw material...................	£127,184,292	$616,843,816
Annual value of the productions of the mining interest.	36,121,000	175,186,850
Annual value of the profits of the shipping interest.......	3,637,231	17,640,570
Annual income from colonies, about	15,000,000	72,750,000
Annual income from foreign trade......................	15,000,000	72,750,000
Annual income from fisheries, about	3,000,000	14,550,000
	£449,942,523	$2,182,221,236

The following table, showing the value of the products of agriculture in France in 1840, we have translated from Jonnè's "Statistique de l'Agriculture de la France," p. 526:

Table exhibiting the value of the agricultural products of France in 1840.

	Francs.	Dollars.*
Gross annual income from the cultivation of crops........	5,092,116,220	947,133,621
Do. of pasturage...........	646,794,905	120,303,853
Do. of woods and forests, nurseries and orchards.....	283,258,325	52,686,053
Total income from vegetable and agricultural productions	6,022,169,450	1,120,123,527

* A franc is considered, in this reduction, equal to 18.6 cents.

	Francs.	Dollars.
Gross annual income from domestic animals............	767,251,000	142,708,686
Gross annual income from animals slaughtered	698,484,000	129,918,024
Total income from animals...	1,465,735,000	272,626,710
Gross annual income from bees-wax and honey............	15,000,000	2,970,000
	1,480,735,000	275,416,710
Grand total of the agricultural, vegetable and animal production of France.........	7,502,904,000	1,395,540,237

Table exhibiting a summary statement of the exports of the products of the United States for the years 1847 *and* 1848.

FISHERIES—THE SEA.

	1847.	1848.
Dried fisheries, or cod fisheries.........	$659,629	$609,482
Pickled fish, or river fisheries, (herring shad, salmon, mackerel).............	136,221	109,315
Whale and other fish oil..............	1,070,659	552,388
Spermaceti oil........................	738,456	208,832
Whalebone...........	671,601	314,107
Spermaceti candles....	191,467	186,839
	$3,468,033	$1,980,963

THE FOREST.

Skins and furs........................	$747,145	$607,780
Ginseng...............................	64,466	162,647
Staves, shingles, boards, hewn timber..	1,849,911	2,429,863
Other lumber........	342,781	283,433
Masts and spars.......................	23,270	129,760
Oak bark and other dye...............	95,355	181,126
All manufactures of wood.............	1,495,924	2,042,695
Naval stores, tar, pitch, rosin, and turpentine.............................	759,221	752,303
Ashes, pot and pearl..................	618,000	466,477
	$5,996,073	$7,059,084

AGRICULTURE.

	1847.	1848.
Product of animals—		
Beef, tallow, hides, horned cattle......	$2,434,003	$1,905,341
Butter and cheese....	1,741,770	1,361,568
Pork, (pickled,) bacon, lard, live hogs..	6,630,842	9,003,272
Horses and mules......................	277,359	190,295
Sheep............	29,100	20,828
Wool......................	89,460	57,497
Vegetable food—		
Wheat..............................	6,049,350	2,669,175
Flour......................	26,133,811	13,194,109
Indian corn..........................	14,395,212	3,837,483
Indian meal..........................	4,301,334	1,807,601
Rye meal..............................	225,502	174,566
Rye, oats, and small grain, and pulse..	1,600,900	376,572
Biscuit or ship bread.................	556,266	619,096
Potatoes..........................	109,062	86,277
Apples......................	92,961	88,944
Rice.............................	3,605,896	2,331,824
	57,070,326	25,185,647
Tobacco.............................	7,242,086	7,551,122
Cotton..........................	53,415,848	61,998,294
Hemp............................	....	27,657
Flax seed..............................	1,346	1,584
Hops..........................	150,654	17,671
Brown sugar......	25,483	8,801
Indigo..........................	10	1,100
	$129,108,317	$107,330,862

MANUFACTURES.

Soap and tallow candles...............	$606,798	$670,223
Leather, boots and shoes...............	243,816	194,095
Household furniture..................	225,700	297,358
Coaches and other carriages...........	75,369	80,963
Hats..........	59,536	55,493
Saddlery................	13,102	27,435
Wax..............................	161,527	134,577
Spirits from grain.....................	67,781	90,957
Beer, ale, porter and cider............	68,114	78,071
Snuff and tobacco..........	658,950	568,435
Linseed oil and spirits of turpentine....	498,110	331,404
Cordage.............................	27,054	29,911
Iron—Pig, bar and nails...	168,817	154,0[illegible]6
Castings........................	68,889	83,188
All manufactures of............	929,778	1,022,408

	1847.	1848.
Spirits, from molasses	$293,609	$269,467
Sugar, refined	124,824	253,900
Chocolate	1,653	2,207
Gunpowder	88,397	125,263
Copper and brass	64,980	61,468
Medicinal drugs	165,793	210,581
Printed and colored	281,320	351,169
White	3,345,902	4,866,559
Nankeen	8,794	2,365
Twist, yarn and thread	108,132	170,633
All other manufactures of	338,375	327,479
Cloth and thread	477	495
Bags, and all manufactures of	5,305	6,218
Wearing apparel	47,101	574,834
Combs and buttons	17,026	16,461
Brushes	2,967	2,120
Billiard tables and apparatus	615	12
Umbrellas and parasols	2,150	2,916
Leather and morocco skins, (not sold per pound)	29,856	16,483
Fire engines and apparatus	3,443	7,686
Printing presses and type	17,431	30,403
Musical instruments	16,997	38,508
Books and maps	44,751	75,193
Paper and stationery	88,731	78,307
Paints and varnish	54,115	50,739
Vinegar	9,526	13,920
Earthen and stone ware	4,758	8,512
Manufactures of glass	71,155	76,007
" tin	6,363	12,353
" pewter and lead	13,694	7,739
" marble and stone	11,229	22,466
" gold and silver and gold leaf	4,268	6,241
Gold and siver coin	62,620	2,700,412
Artificial flowers and jewelry	3,126	11,217
Molasses	26,959	5,563
Trunks	5,270	6,126
Brick and lime	17,623	24,174
Domestic salt	42,333	73,274
Coal	....	47,112
Lead	124,981	84,278
Ice	....	75,547
Articles not enumerated—		
Manufactured	1,108,984	1,137,828
Other articles	1,199,276	851,383
Government stores to the army from N. York	326,800	....
	$12,065,041	$16,533,212

RECAPITULATION.

	1847.	1848.
Fisheries, the sea	$3,468,033	$1,980,963
The forest	5,996,073	7,059,084
Agriculture	129,108,317	107,330,862
Manufactures	12,065,041	16,533,212
Total	$150,637,464	$132,904,121

From Stryker's American Quarterly Register and Magazine.

DOMESTIC EXPORTS.

The following statements show the total value of all articles of domestic produce and manufacture exported from the United States since 1821; and also the value of breadstuffs and provisions, alone, during the same period, in order to show the per centage of these articles in the whole amount:

	Total domestic exports.	Breadstuffs and provisions.
1821	$43,671,894	$12,341,901
1822	49,874,079	13,886,856
1823	47,155,408	13,767,847
1824	53,649,500	15,059,484
1825	66,944,745	11,634,449
1826	53,055,710	11,303,496
1827	58,921,691	11,085,556
1828	50,609,699	11,461,144
1829	55,700,193	13,131,858
1830	59,462,029	12,075,430
1831	61,277,057	17,538,227
1832	63,137,470	12,424,703
1833	70,317,698	14,209,128
1834	81,024,162	11,524,024
1835	101,189,082	12,009,399
1836	106,916,618	10,614,130
1837	95,564,414	9,558,359
1838	96,033,821	9,636,650
1839	103,533,891	14,147,779
1840	113,895,634	19,067,535
1841	106,382,722	17,196,102
1842	92,969,996	16,902,876
1843	77,993,783	11,204,123
1844	99,725,179	17,970,135
1845	99,299,776	16,743,421
1846	102,141,869	27,701,121
1847	150,637,464	68,701,921
1848	132,904,121	37,472,754

Table exhibiting the exports of flour from the United States during the years 1840, 1846, 1847, *and* 1848.

To—	1840.	1846.	1847.	1848.
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*
England	620,128	1,015,244	2,457,076	958,744
Gibraltar	12,891	7,302	23,974	6,038
British East Indies	4,565	3,356	7,358	5,091
British West Indies	232,329	292,715	274,275	227,226
British American colonies	432,356	310,091	272,299	274,206
France	74,416	9,138	612,814	28,895
French West Indies	10,491	10,632	25,414	21,269
Hayti	28,724	42,907	40,257	28,009
Cuba	69,818	13,831	50,446	29,872
Spanish West Indies	20,966	10,803	17,780	14,846
Mexico	15,826	15,922	5,928	12,070
Venezuela	28,707	35,670	37,604	28,446
Brazil	197,823	296,460	254,300	294,816
Other places	144,142	225,405	303,371	190,865
Total	1,893,182	2,289,476	4,382,496	2,119,393
Value, dollars	10,355,000	11,668,000	26,133,811	13,194,109

Table exhibiting the quantities of certain articles of provisions exported from the United States from 1837, *inclusive, to* 1848, *inclusive.*

Years.	Beef.	Butter.	Cheese.	Pork.	Hams.	Lard.
	Barrels.	*Pounds.*	*Pounds.*	*Barrels.*	*Pounds.*	*Pounds.*
1837	28,076	281,939	411,338	24,582	965,939	6,388,174
1841	56,537	3,785,983	1,748,471	133,290	2,796,517	10,597,654
1844	106,474	3,251,952	7,343,145	161,629	3,886,976	25,746,355
1846	149,223	3,436,660	8,675,390	190,422	3,006,630	21,843,164
1847	111,979	4,214,433	15,637,600	206,190	17,921,471	37,611,161
1848	103,719	2,751,036	12,913,305	218,269	33,551,034	49,619,539

We give the following table of the importations of breadstuffs and produce into the United Kingdom of Great Britain and Ireland, for the years 1847, 1848, and 1849, and the quantities entered for consumption, with the view of showing the farmers of this country the present extent of the demand of that kingdom for their products, and of giving them some basis upon which they can estimate the probabilities of a future increase of that demand.

Agricultural products imported into the United Kingdom, and entered for home consumption, for the years ending January 5, 1847–'8–'9.

Articles.	Quantities imported.			Quantities entered for home consumption.		
	1847	1848	1849	1847	1848	1849
* Bacon, cwt	2,960	90,530	211,121	Free.	Free.	Free.
Bark for tanners' or dyers' use	488,059	313,111	353,847	....	....	....
Beef, salted, not corned	175,051	112,683	113,611	....	....	....
Beef, fresh, or slightly salted	2,121	5,011	7,526	....	....	....
Butter	257,385	314,125	295,663	255,131	315,611	288,172
Cheese	341,682	354,802	444,032	327,385	366,289	431,401
† Corn: wheat, quarters	1,432,591	2,656,454	2,594,013	1,995,948	2,851,983	1,864,186
Barley, and beer or bigg	370,841	773,174	1,061,819	400,443	795,490	899,960
Oats	789,338	1,705,708	977,761	772,554	1,761,248	882,559
Rye	1,762	68,817	62,891	1,635	68,956	48,721
Peas	212,618	157,618	217,763	181,800	194,171	167,082
Beans	255,047	443,675	490,353	209,874	487,846	450,695
Maize or Indian corn	705,806	3,608,312	1,536,771	720,581	3,615,219	1,579,898
Buckwheat	22,947	22,917	205	22,748	23,349	205
Wheat meal or flour, cwt	3,190,429	6,329,058	1,765,475	3,384,429	6,810,843	1,228,925
Barley meal	13,810	11,790	65	14,404	11,790	64
Oat meal	11,165	57,883	6,706	10,824	58,009	6,165
Rye meal	280	785,412	36,010	282	785,412	30,534
Bean meal	....	88	28	....	88	28
Indian meal	131,808	1,448,837	234,114	126,954	1,452,147	210,521
Buckwheat meal and pea meal	72	923	298	72	923	294
Eggs, number	72,252,159	77,485,487	88,097,277	72,301,319	77,553,021	88,091,277
Hams, cwt	11,242	17,203	7,984	8,378	15,833	6,974
Meat, salt or fresh, not otherwise described, cwt	1,118	3,114	4,436	Free.	Free.	Free.
Pork, salted, cwt	72,656	235,798	252,680	....	....	....
fresh	138	101	61	....	....	....
Rice in the husk, qrs	32,381	42,980	35,694	33,885	3,349	19,852
Tallow, cwt	1,111,818	1,099,275	1,500,642	1,189,685	1,072,323	1,411,944
Tobacco, unmanufactured, lbs	53,170,228	33,909,584	31,481,798	26,738,604	26,545,020	27,061,480
Wool, cotton, cwt	4,177,288	4,238,461	6,362,090	Free.	Free.	Free.
Wool, sheep and lambs, lbs	65,255,462	62,592,598	70,521,957	....	....	....

* 112 pounds.

† The imperial quarter is eight bushels.

Table showing the average prices per stone of various qualities of meat sold in Smithfield market in the months of October, November, and December, 1848, at the rate of 8 lbs. to the stone, and the prices of Monday, February 26, 1849, and of February 28, 1848.

Varieties of meat.	October.	November	December.	Feb. 26, 1849.	Feb. 28, 1848.
	s. d.	*s. d.*	*s. d.*	*s. d. s. d.*	*s. d. s. d.*
Inferior oxen	2 10	3 0	3 2	2 6 to 2 8	3 4 to 3 6
Second class do	3 6	3 6	3 8	2 10 to 3 0	3 8 to 3 10
Prime large do	3 10	4 0	4 0	3 0 to 3 2	4 1 to 4 2
Seats	4 2	4 4	4 6	3 4 to 3 6	4 4 to 4 6
Inferior calves	3 6	3 8	3 10	3 6 to 4 2	4 0 to 4 6
Prime do	4 0	4 2	4 4	4 4 to 4 8	4 8 to 5 0
Inferior sheep	3 4	3 2	3 8	3 0 to 3 2	3 8 to 3 10
Prime Cotswold wethers	4 6	4 5	4 8	4 0 to 4 2	4 8 to 5 2
South Downs	4 10	4 10	5 2	4 4 to 4 6	5 4 to 5 6
Large hogs	4 2	4 1	4 4	3 0 to 3 6	4 0 to 4 6
Neat young porkers	4 10	4 8	4 10	3 8 to 4 4	4 8 to 5 0

Prices current and imports of wool at Liverpool, December 30, 1848.

AUSTRALIAN AND VAN DIEMAN'S LAND.

	Sydney.	Port Philip and Hobart town.	Port Adelaide.
	s. d. s. d.	*s. d. s d.*	*s. d. s. d.*
Secured, extra fine	1 5 *a* 1 10	1 3 *a* 1 8	1 0 *a* 1 4
Fine combing	1 3 *a* 1 6	1 2 *a* 1 5	1 1 *a* 1 2
Second combing	1 1 *a* 1 5	0 11 *a* 1 3	0 9 *a* 0 11
Fine clothing	1 3 *a* 1 7	1 1 *a* 1 6	0 11 *a* 1 1
Second clothing	1 1 *a* 1 3	0 11 *a* 1 0	0 9 *a* 0 11
Inferior clothing	0 10 *a* 1 0	0 9 *a* 0 11	0 7 *a* 0 8
Lambs'	1 0 *a* 1 3	0 10 *a* 1 6	0 9 *a* 1 3½
Skin	0 6 *a* 1 6	0 6 *a* 1 1	0 5 *a* 1 0
Pieces and locks	0 6 *a* 1 0	0 6 *a* 0 9	0 5 *a* 0 8
Grease	0 4 *a* 0 8	0 5 *a* 0 8	0 5 *a* 0 6½

UNITED STATES.

	s. d. s. d.
Fine merino fleece, clean	1 0 *a* 1 4
inferior washed	0 9 *a* 1 0
Half breed merino fleece, clean	0 10 *a* 1 0
inferior washed	0 8 *a* 0 11
Coarse to first cross, clean	0 8 *a* 0 11
inferior washed	0 6 *a* 0 8
Slipe and skin, (as per condition,) fine	0 10 *a* 1 0
2d quality	0 8 *a* 0 10
3d quality	0 6 *a* 0 8

SPANISH.

	R.	F. & S.	A.
	s. d. s. d.	*s. d. s. d.*	*s. d. s. d.*
Leonera	1 1 *a* 1 4	0 11 *a* 1 1	0 10 *a* 1 1
Segovia	1 0 *a* 1 2	0 10 *a* 1 0	0 9 *a* 1 0
Soria and Seville	0 10 *a* 1 0	0 9 *a* 0 10	0 9 *a* 0 11

IRISH.

	s. d. s. d.
Hog fleeces	0 9 *a* 0 10
Ewe and wether	0 8 *a* 0 9

SCOTCH.

Laid cheviot (per 24 pounds)	11 0 *a* 14 6
cross........do	8 0 *a* 10 0
highland.....do	5 6 *a* 6 0
White cheviot .....do	12 0 *a* 18 0
highland....do	8 0 *a* 9 9

ENGLISH.

Fleeces, per pound	0 7 *a* 0 11

Imports of wool into Liverpool, from 1843 to 1848, inclusive.

Description.	1848.	1847.	1846.	1845.	1844.	1843.
	*Bales.**	*Bales.*	*Bales.*	*Bales.*	*Bales.*	*Bales.*
New South Wales and Van Dieman's Land	5,011	4,961	3,144	5,529	5,402	3,820
Cape of Good Hope	393	35	450	531	234	41
Spanish	....	114	1,043	643	573	259
Portugal	2,892	2,985	3,274	3,246	6,359	1,682
United States	141	1,459	1,982	3,976	246	....
Peruvian and Alpaca	48,270	42,945	49,031	31,391	13,818	20,434
River Platte	4,304	3,351	876	5,208	3,658	2,498
East India	10,524	5,698	4,654	7,180	4,503	3,920
Mediterranean ports	2,978	7,160	12,133	10,216	11,255	1,342
Sundries	896	1,423	1,078	5,367	2,951	811
Total foreign	75,409	70,181	77,665	73,317	48,999	34,867
Scotch	20,229	17,630	17,894	16,465	18,083	21,226
Irish	5,047	5,354	3,226	5,505	4,039	4,745
English	599	1,057	1,426	2,186	1,888	1,735
	101,284	94,222	100,211	97,473	73,009	62,573

* The sack of British wool = 364 pounds.
The pack is 240 pounds.
The German bale weighs about 350 pounds.

Waterston, Cyc. of Commerce.

Liverpool imports of foreign and British wool, for the month ending 30th December, 1848.

New South Wales and Van Diemen's Land	32
Cape of Good Hope	....
Spanish	....
Portugal	72
United States	8
Peruvian	2,002
River Platte	206
East India	....
Mediterranean	20
Sundries	....
Total foreign	2,332
Scotch	91
Irish	272
Total	2,695

Comparative statement of imports, stocks, and prices of provisions in Liverpool.

Imports from 1st January to 31st December.

Years.	Beef.		Pork.	Bacon.	Cheese.		Lard.	
	Tierces.	Barrels.	Barrels.	Cwts.	Cks.	Boxes.	Barrels.	Kegs.
1846	25,913	9,218	14,871	....	4,049	58,749	21,635	65,501
1847	16,591	4,168	29,155	50,319	6,670	55,730	29,757	5,268
1848	16,183	2,253	33,253	131,937	6,027	110,803	88,332	7,522

Comparative statement—Continued.

Stocks 31st December.					Prices at close of each year.				
Beef.	Pork.	Bacon.	Cheese.	Lard.	Beef.	Pork.	Bacon.	Cheese.	Lard.
Tierces.	Barrels.	Cwts.	Tons.	Tons.	s. d. s. d.	s. s.	s. s.	s. s.	s. s.
2,750	5,300	....	440	420	80 *a* 85	62 *a* 68	....	50 *a* 53	45 *a* 46
2,499	8,211	6,360	165	120	86 *a* 90	42 *a* 60	43 *a* 52	46 *a* 49	55 *a* 58
1,319	2,305	4,320	334	1,740	87 6 *a* 92 6	40 *a* 50	40 *a* 46	44 *a* 48	37 *a* 38

J. W. CATER & CO.

Import of cotton wool into Great Britain in the year 1848.

	LIVERPOOL.											
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Growth of United States, from—												
New Orleans and Natchez	23,563	41,065	22,088	80,989	109,274	119,252	77,951	46,461	26,550	30,785	27,339	31,043
Mobile	1,892	5,645	8,576	32,995	51,990	56,563	9,719	20,630	7,83	9,531	1,750	4,031
Florida	......	2,356	1,454	6,911	10,276	16,725	....	3,202	2,495	....	......	......
Savannah and Darien	5,350	6,477	10,767	17,522	21,483	18,162	11,800	5,86[illegible]	10,529	3,981	4,687	5,227
Charleston	7,751	8,949	9,161	20,942	31,129	20,991	10,819	6,018	6,424	13,073	12,065	9,990
Other ports	4,026	3,822	8,840	13,430	22,047	15,069	7,208	13,869	8,042	11,798	6,807	6,722
Total American	42,782	71,314	60,889	172,787	249,194	246,762	117,497	96,048	61,875	69,177	52,548	57,018
Brazil and Portugal	11,522	5,808	3,353	10,850	8,051	2,572	8,731	2,274	10,818	10,690	17,690	7,844
Mediterranean	262	1,907	2,999	921	5,035	1,485	5,158	3,279	2,381	3,019	365	996
East Indies	8,130	15,052	17,332	14,051	5,595	2,076	17,087	1,128	4,081	28,837	22,343	......
Demerara, West Indies, &c	910	926	195	196	1,250	1,150	241	51	362	28	610	176
Total packages	63,606	94,999	84,768	193,808	269,125	254,045	148,714	103,080	79,517	111,745	93,656	66,034

Imports of cotton wool—Continued.

	LIVERPOOL. Total in		LONDON. Total in		BRISTOL AND HULL. Total in		SCOTLAND. Total in		Total import into Great Britain in	
	1848.	1847.	1848.	1847.	1848.	1847.	1848.	1847.	1848.	1847.
Growth of the United States, from—										
New Orleans and Natchez	639,365	393,897	2,100	2,700	9,000	13,400	66,300	27,281	1,375,385	874,100
Mobile	214,158	133,678								
Florida	43,414	28,914								
Savannah and Darien	122,053	94,812								
Charleston	157,315	117,857								
Other ports	121,680	61,518								
Total American	1,237,985	830,706	2,100	2,700	9,000	13,400	66,300	27,281	1,375,385	874,100
Brazil and Portugal	100,201	109,635	....	300	....	....	....	291	100,201	110,200
Mediterranean	27,810	20,729	1,200	....	....	....	....	....	29,010	20,700
East Indies	136,012	122,043	64,700	77,400	6,400	9,100	20,400	14,218	227,512	222,800
Demerara, West Indies, &c	6,089	3,940	1,500	700	....	....	300	346	7,889	4,900
Total packages	1,568,097	1,087,058	69,500	81,100	15,400	22,500	87,000	42,139	1,739,99[illegible]	1,232,700

Increase of imports in 1848.................. 507,297

Growth of America, not taking into the account the quantity remaining on hand in the interior.

1820–'21	430,000	1827–'28	720,593	1834–'35	1,254,328	1841–'42	1,684,211
1821–'22	455,000	1828–'29	870,415	1825–'36	1,360,725	1842–'43	2,378,875
1822–'23	495,000	1829–'30	976,845	1836–'37	1,422,930	1843–'44	2,030,409
1823–'24	560,000	1830–'31	1,038,847	1837–'38	1,801,497	1844–'45	2,394,503
1824–'25	569,259	1831–'32	987,477	1838–'29	1,360,532	1845–'46	2,100,537
1825–'26	720,027	1832–'33	1,070,438	1839–'40	2,177,835	1846–'47	1,778,651
1826–'27	957,281	1833–'34	1,205,394	1840–'41	1,634,945	1847–'48	2,347,634

[In 1785, the import into Liverpool from America was only 5 bags; in 1786, 6 bags; in 1787, 108 bags.]

Probable consumption of America.

1826–'27	100,000	1832–'33	190,000	1838–'39	275,000	1844–'45	400,000
1827–'28	115,000	1833–'34	200,000	1839–'40	300,000	1845–'46	425,000
1828–'29	120,000	1834–'35	215,000	1840–'41	320,000	1846–'47	430,000
1829–'30	130,000	1835–'36	230,000	1841–'42	300,000	1847–'48	530,000
1830–'31	160,000	1836–'37	220,000	1842–'43	350,000		
1831–'32	175,000	1837–'38	250,000	1843–'44	370,000		

LIVERPOOL, *December* 31, 1848.

GEORGE HOLT & CO., *Cotton Brokers.*

Import.—The table of *import* into Great Britain, compared with the preceding year, shows an increase of 501,200 American, 8,300 Egyptian, 4,700 East India, and 3,000 West India, and a decrease of 10,000 Brazil, making a total increase of 507,200 bags.

Consumption.—The average *consumption* of Great Britain we estimate at 28,146 bags, consisting of 6,519 Upland, 15,929 New Orleans and Alabama, and 427 Sea Island; total American, 22,875, 1,419 Brazil, 725 Egyptian, &c., 2,977 East India, and 150 West India, being an increase upon the consumption of last year of 5,881 bags per week; but in packages, at the average consumption of that year, of 6,841 bags, or, for the whole year, one hundred and thirty-five millions and a quarter of pounds weight.

Stock.—The *stock* in the kingdom, as compared with the last year, shows an increase of 62,100 American, 15,400 Brazil, 18,000 East India, and a decrease of 8,800 Egyptian, and 100 West India, making a total increase of 86,700 bags.

(*Weight.*—The *average weight* of the import we calculate at 370 pounds per bag for Upland, 443 New Orleans and Alabama, 334 Sea Island, 180 Brazil, 210 Egyptian, 366 East India, and 210 West India, &c., making the total import in pounds weight 596,491,000, being an increase upon the last year of 221,505,000 pounds weight.)

GEORGE HOLT & Co.,
Cotton Brokers.

LIVERPOOL, *December* 29, 1849.

The following table of prices of American produce, quarterly, during the year 1848, is prepared from Stitt, Day, & Company's Price Current.

	January 14, 1848.		May 12, 1848.		September 15, 1848.		January 12, 1849.	
	s. d.	*s. d.*	*s. d.*	*s d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Ashes—duty free—brand, 1846-'47—								
Montreal......pot..........per cwt.	28 6	29 0	30 0	31 0	27 6	28 0	44 0	46 0
....Do........pearl..........do....	33 0	34 0	40 0	45 0	30 0	32 0	36 0	38 0
United States..pot..........do....	26 6	27 0	28 6	29 0	24 0	25 0	42 0	43 0
....Do........pearl..........do....	30 0	31 0	40 0	45 0	27 0	28 0	34 0	35 0
Bacon—duty free—dried and smoked, old..........do....	15 0	30 0	15 0	30 0	15 0	22 0	15 0	22 0
Long middles free from salt..........do....	24 0	40 0	Eastern.		Eastern.		Eastern.	
....Do......rib in..........do....	22 0	35 0	50 0	54 0⅓	None.		30 0	46 0
Short middles free from bone..........do....	25 0	40 0	Western.		Western.		Western.	
....Do......rib in..........do....	22 0	36 0	36 0	52 3	21 0	45 0	30 0	34 0
Shoulders..........do....	20 0	28 0	20 0	23 0	24 0	30 0	20 0	26 0
Bark—duty free—								
Quercitron, per cwt., New York and Philadelphia..........	9 0	11 0	8 0	10 6	7 6	10 0	7 6	10 0
Beef—duty free—								
Prime mess, per tierce, 304 lbs......new..........	84 0	90 0	85 0	92 6	85 0	90 0	87 6	90 0
....Do......do......do..........ordinary..........	70 0	76 0	76 0	83 0	80 0	0 0	80 0	85 0
....Do......do......do..........old..........	63 0	84 0	60 0	68 0	None.		None.	
Mess, per barrel, 200 lbs..........	40 0	46 0	50 0	54 0	None.			
....Do....do....ordinary..........	36 0	40 0	36 0	46 0	36 0	46 0		
Prime, per barrel..........	30 0	32 0	30 0	36 0	30 0	40 0		
Extra India, family, &c., per tierce, 336 lbs..........	95 0	100 0	97 0	105 0	None.		None.	
....Do.......do........per ½-barrel, 100 lbs..........	30 0	35 0	30 0	35 0	26 0	35 0		
Bees' wax, unbleached—duty free—per cwt..........	£5 0 0	6 0 0	£5 0 10	6 0 10	£5 0 10	6 0 10	£5 0 0	6 0 0
Bones—duty free—								
Shank, per ton..........	£6 0 0	8 0 0	£6 0 0	8 0 0	£6 0 0	8 0 0	£6 0 0	8 0 0
Mixed....do..........	£3 0 0	5 0 0	£3 0 0	5 0 0	£3 0 0	5 0 0	£3 0 0	5 0 0
Butter—duty B. P. 2s. 6d. per cwt., For. 10s. p. cwt.—grease free—								
U. S. fine, duty paid, per cwt..........	None.		None.		None.		None.	
Canadian..........do..........	63 0	70 0	None.		64 0	67 0	50 0	64 0
Grease..........	None.		40 0	45 0	50 0	54 0	25 0	28 0

Table of prices of American produce—Continued.

	January 14, 1848.				May 12, 1848.				September 15, 1848.				January 12, 1849.			
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Cheese—duty B. P. 1s. 6d., For. 5s. 6d.—																
Fine, duty paid, per cwt	46	0	49	0	48	0	52	0	48	0	52	0	44	0	50	0
Middling....do....do	38	0	45	0	43	0	46	0	40	0	45	0	36	0	42	0
Ordinary....do....do	20	0	27	0	36	0	42	0	20	0	38	0	28	0	34	0
Corn, &c.—duty free, till 1st March, 1848—																
Wheat, United States and Canadian, per 70 lbs.																
...Do...white and mixed	8	0	9	0	7	0	8	2	8	1	9	0	7	0	7	8
...Do...red	6	6	8	0	6	5	7	3	7	7	8	3	6	6	7	3
Flour, western canal, per barrel	29	0	29	6	27	6	28	0	33	0	34	0	26	6	27	0
..Do..Richmond and Alexandria	28	0	29	0	27	0	27	6	32	0	33	0	26	6	27	0
..Do..Philadelphia and Baltimore	28	0	29	0	27	0	27	6	32	0	33	0	27	0	28	0
..Do..New Orleans and Ohio	27	0	28	0	26	0	27	0	32	0	33	0	26	0	27	0
..Do..Canadian	28	0	30	0	27	0	28	0	33	0	34	0	25	0	25	6
..Do..United States and Canadian, sour	22	0	24	0	24	6	25	6	30	0	31	0	2	2	2	5
Oats, per 45 lbs	2	6	3	0	2	0	2	8	2	6	3	0	21	0	23	6
Oat meal, per 240 lbs	23	0	27	0	22	0	23	0	24	0	[illegible]	0	30	6	32	0
Indian corn, per 480 lbs	31	0	34	0	25	0	28	6	34	0	36	0	14	6	15	0
Indian meal, per barrel, 196 lbs	14	0	15	0	11	9	12	3	16	6	17	6	3	6	4	0
Barley, per 60 lbs	3	0	4	0	3	0	3	8	3	0	3	8	3	0	3	8
Rye, per 60 lbs	3	0	3	9	3	0	3	8	3	0	3	8	30	0	32	0
Peas, per 504 lbs	33	0	40	0	28	0	32	0	33	0	38	0	25	0	25	0
Kidney beans, BE and Re peas, per 480 lbs	35	0	45	0	20	0	25	0	25	0	35	0	...			
Cotton—duty free—[No returns corresponding with the other three quarters have been received for the first.]																
Uplands—Ordinary—duty free	...				0	$3\frac{3}{8}$	0	$3\frac{1}{2}$	0	$3\frac{1}{8}$	0	$3\frac{3}{8}$	0	$3\frac{3}{8}$	0	$3\frac{3}{4}$
Middling	...				0	$3\frac{3}{4}$	0	0	0	$3\frac{5}{8}$	0	0	0	$3\frac{5}{8}$	0	0
Middling fair	...				0	$4\frac{1}{8}$	0	0	0	4	0	0	0	4	0	0
Fair	...				0	$4\frac{3}{8}$	0	0	0	$4\frac{1}{8}$	0	0	0	$4\frac{1}{8}$	0	0
Good fair	...				0	$4\frac{1}{2}$	0	0	0	$4\frac{3}{8}$	0	0	0	$4\frac{3}{8}$	0	0
Good	...				0	5	0	0	0	$4\frac{5}{8}$	0	$4\frac{7}{8}$	0	$4\frac{5}{8}$	0	0
Fine	...				0	0	0	0	0	5	0	0	0	0	0	0
New Orleans—Ordinary	...				0	$3\frac{1}{2}$	0	$3\frac{3}{4}$	0	3	0	$3\frac{3}{8}$	0	$3\frac{1}{2}$	0	$3\frac{3}{4}$
Middling	...				0	4	0	0	0	$3\frac{5}{8}$	0	$3\frac{3}{4}$	0	4	0	0

	From	To	From	To	From	To	From	To
Middling fair			0 4⅜	0 0	0 4	0 4¼	0 4¼	0 0
Fair			0 4⅞	0 0	0 4⅝	0 0	0 4⅜	0 0
Good fair			0 5¼	0 0	0 5	0 5⅛	0 4¾	0 0
Good			0 5½	0 6	0 5¼	0 5½	0 5¼	0 5½
Choice marks			0 6½	0 7¼	0 6	0 6½	0 6	0 6¼
Mobile—Ordinary			0 3½	0 3¾	0 3	0 3¼	0 3¼	0 3¾
Middling			0 4	0 0	0 3⅝	0 0	0 3⅞	0 4
Middling fair			0 4⅛	0 0	0 3⅞	0 0	0 4⅛	0 0
Fair			0 4⅜	0 0	0 4⅛	0 0	0 4¼	0 0
Good fair			0 4⅛	0 0	0 4¼	0 0	0 4½	0 0
Good			0 4¾	0 0	0 4½	0 0	0 4¾	0 5
Fine			0 0	0 0	0 0	0 0	0 0	0 0
Sea Island—Ordinary to middling			0 7	0 9	0 7	0 9	0 7	0 8½
Fair to good fair			0 10	0 11	0 10	0 11½	0 9½	0 10½
Good to fine			0 14	0 17	0 13	0 16	0 11	0 15
stained			0 4	0 7	0 4	0 7	0 4	0 8
Hams, dry—duty B. P. 2s. per cwt., For. 7s —								
Smoked or dry in canvas, per cwt., duty paid	20 0	50 0	15 0	40 0	20 0	50 0	15 0	40 0
In casks, in salt, not smoked, per cwt., duty free	25 0	35 0	15 0	34 0	25 0	45 0	20 0	43 6
Hemp—duty free—								
New-rotted, per ton	£25 0 0	28 0 0	£23 0 0	25 0 0	£23 0 0	25 0 0	£24 0 0	26 0 0
Hackled ......do	£28 0 0	30 0 0	£25 0 0	26 0 0	£26 0 0	29 0 0	£28 0 0	30 0 0
Hides—duty free—								
Wet salted, per lb.	0 1⅝	0 2	0 1⅞	0 1⅞	0 1¾	0 1⅞	0 1⅞	0 2
Dry..........do	0 3¾	0 4	0 3½	0 0	0 3½	0 0	0 2¾	0 3
Kips..........do	0 3¾	0 4	0 2⅜	0 2⅝	0 0	0 3	0 2¼	0 2¾
Tanned.......do..oak bark	0 4	1 0	0 4	1 0	0 4	1 0	0 4	1 0
..Do.........do..hemlock	0 3	0 9	0 3	0 9	0 3	0 9	0 3	0 9
Horns—duty free—								
Buffalo, per cwt.	8 6	16 0	7 0	10 0	9 6	12 0	8 0	10 0
Ox and cow, per 123	8 0	35 6	8 0	35 6	8 0	35 6	9 0	37 6
Tips, buffalo, per cwt.	13 0	15 0	9 0	12 0	13 0	15 0	9 0	12 0
Hops—duty 45s. per cwt., in bond, per cwt.	30 0	50 0	30 0	50 0	30 0	50 0	30 0	50 0
Lard—duty free—								
Fine leaf in leaf in kegs, per cwt.	55 0	58 0	44 0	45 0	42 0	45 0	34 0	35 0
......Do.......in barrels	53 0	56 0	43 0	45 0	39 0	43 3	33 6	34 0
Ordinary to middling	50 0	52 0	38 0	40 0	36 6	38 0	32 0	33 0
Inferior and grease	30 0	33 0	30 0	36 0	30 0	35 0	27 0	32 0
Linseed cake—duty free, per ton.	£8 10 0	9 10 0	£7 0 0	7 15 0	£6 0 0	7 0 0	£7 10 0	8 0 0
Lead—duty B. P. 5s. per ton, For. 20s. per ton—								
Pig, in bond, per ton	£15 10 0	17 0 0	£15 10 0	17 0 0	£15 10 0	17 0 0	£15 0 0	15 10 0

Table of prices of American produce—Continued.

	January 14, 1848.	May 12, 1848.	September 15, 1848.	January 12, 1849.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Oils—Lard, duty free, per tun	None.	£35 0 0 42 0 0	None.	£30 0 0 32 0 0
Sperm, duty £15 per tun; duty paid per tun	£86 0 0 88 0 0	£75 0 0 80 0 0	£86 0 0 88 0 0	Nominal.
Whale, duty free, per tun	£27 0 0 28 10 0	£24 0 0 26 10 0	£24 0 0 26 10 0	£24 0 0 26 10 0
Pitch—duty free, per cwt	2 6 3 0	2 0 2 6	2 6 3 0	2 0 2 6
Pork—duty free—				
Prime mess, new, per barrel, 200 lbs	48 0 60 0	40 0 60 0	55 0 70 0	None.
....Do....old.........do	30 0 40 0	None.	44 0 56 0	40 0 50 0
Mess..................do	50 0 56 0	50 0 56 0	44 0 60 0	None.
Prime	35 0 40 0	36 0 38 0	35 0 45 0	0 0 56 0
Rice—duty free—				
Carolina dressed, 1st quality	19 9 21 6	18 6 20 6	17 0 19 0	21 6 22 0
.......Do.......2d quality	16 6 18 6	17 6 18 6	15 0 17 0	18 0 20 0
Rosin—duty free—Amber and yellow, per cwt	1 11 7 0	3 6 8 0	2 1 6 0	3 3 10 0
Seeds—Flax, duty free, per hogshead of 7 bushels	43 0 46 0	None.	50 0 60 0	None.
Clover, duty 5s. per cwt.; duty paid, per cwt	35 0 40 0	30 0 40 0	30 0 40 0	30 0 40 0
Timothy, duty free	20 0 25 0	20 0 25 0	20 0 25 0	20 0 25 0
Staves, duty free—				
White oak pipe, per mille of 1200	£11 0 0 15 0 0	£11 0 0 15 0 0	£11 0 0 15 0 0	£11 0 0 15 0 0
....Do....hogshead....do	£10 0 0 14 0 0	£10 0 0 14 0 0	£10 0 0 14 0 0	£10 0 0 14 0 0
....Do....barrel.......do	£4 10 0 7 10 0	£4 10 0 6 0 0	£4 10 0 7 10 0	£4 10 0 6 0 0
Sugar—				
Louisiana, white clayed not refined, duty 23s. 4d. per cwt. Duty paid, per cwt	None.	None.	None.	None.
Muscovado, duty 20s. Duty paid	None.	None.	None.	None.
Tallow—duty B. P. 1d. per cwt., For. 1s. 6d. Duty paid, per cwt	45 0 47 6	45 0 48 0	46 0 49 0	33 0 41 0
Tar—duty free, per barrel	12 0 14 0	14 0 15 0	11 0 12 0	13 6 14 6
Tobacco—duty on leaf, 3s. 2d., and manufact'd, 9s. 6d. per lb—				
Virginia leaf, faded, per lb., in bond	0 2½ 0 2¾	0 2½ 0 0	0 2½ 0 2¾	0 2½ 0 0
Ordinary sound	0 3 0 3½	0 3 0 0	0 3 0 3½	0 3 0 0
Middling	0 0 0 4	0 3½ 0 0	0 4	0 3½ 0 0
Good	0 4½ 0 5	0 4 0 4½	0 4½ 0 5	0 4 0 4½
Fine	0 5¼ 0 6	0 5 0 0	0 0 0 5½	0 5 0 5¼

Stemmed, sound	0	3	0	6	0	3	0	6	0	3	0	6½	0	3	0	6
Kentucky leaf	0	2¾	0	4	0	2¾	0	4	0	2¾	0	4	0	2¾	0	5
Stemmed	0	3	0	5½	0	3	0	5½	0	3	0	5½	0	3	0	6
Manufactured	0	4	0	9	0	4	0	9	0	4	0	9	0	2	0	9
Tongues—duty B. P. 2s. 0d. per cwt., For. 7s.—																
Ox, in pickle, duty paid, per dozen	10	0	16	0	12	0	20	0	10	0	16	0	12	0	20	0
Pigs....do......do.....per cwt	15	0	25	0	20	0	35	0	15	0	25	0	20	0	35	0
Turpentine—duty free, unless above 15s. per cwt. in value; duty then 2s. per cwt.—																
Rough, duty free, per cwt	5	6	6	6	7	0	9	5	6	0	8	0	6	0	7	6
Spirits, duty 5s. per cwt., duty paid, per cwt	33	0	35	0	37	0	38	0	32	0	33	0	30	0	32	0
Whalebone—duty free, per cwt	None.				None.				None.				None.			
Wool—duty free, per lb.—																
Merino and Saxony fleece					1	2	1	8	1	2	1	8	1	2	1	9
Half bred fleece					0	11	1	2	1	0	1	2	1	0	1	2
Common fleece					0	9	0	10	0	10	0	11	0	11	1	0
Super skin					1	0	1	2	1	0	1	4	1	2	1	4
Half fine skin					0	10	0	11	0	11	1	2	1	0	1	2
Common skin					0	7	0	9	0	9	0	10½	0	10	1	0
Canadian lamb skin, fine					0	10	1	1	0	10½	1	1	1	0	1	2
........do........ inferior					0	8	0	9	0	8	0	10	0	8	0	10
Unwashed fleece					0	3	0	7	0	3	0	7	0	3	0	7

LEGATION OF THE U. S., *Canton, China, Nov.* 27, 1848.

DEAR SIR: Agreeably to your request, as expressed in your note to me of February last, I immediately on my arrival in China sought some suitable person to carry out your object in relation to the exchange of garden seeds, &c., with this country. I obtained the services of Mr. S. Wells Williams, a citizen of the United States, who is an old and highly esteemed resident in this place, and has a thorough knowledge of horticulture and botany. I handed over to him the box of seeds with which I was charged, and from a partial report made to me, herewith sent you, you will see that he is making every effort to effect a valuable exchange.

I had hoped to find some Chinaman to whom I could have committed the management of this subject; but, upon inquiry, no one qualified for the business could be found. Mr. Williams understands the language of the country; and is well acquainted with its plants, vegetables, &c., and their adaptation to the soil and climate of the United States; and for the purpose of procuring such as will live and thrive in our country, he has sent to the more northern parts of China to obtain such as are new and valuable. So soon as exchanges can be effected they will be sent to you by the first suitable conveyance.

Very respectfully, your obedient servant,

JOHN W. DAVIS.

Hon. E. BURKE, *Com. of Patents.*

CANTON, *November* 22, 1848.

SIR: In compliance with your request that I would take charge of the box of vegetable seeds sent out by Mr. Burke of the Patent Office, I have opened the box, and distributed the contents. It contained four parcels of seeds, one of which lay loose in the box, the others were done up in a wrapper. I have sent two of these larger parcels to the Rev. Dr. Bridgman at Shanghai, accompanying them with a letter requesting him to distribute one of them to gardeners, and other persons in that place, in exchange for the seeds of fruit and vegetables common in that region, and to send the other to Ningpo, to Dr. D. B. McCartee and Dr. Macgowan, two physicians residing there, both of whom will be willing, I think, to forward the views of Mr. Burke. I wrote them, briefly explaining these views, and assuring them that the slight expenses they might be at in putting up and forwarding such seeds as they could procure, would be repaid to their order in Canton. From both these places, returns may be looked for during the coming year; and, as soon as either of these gentlemen return an answer respecting the reception and disposal of the packet of seeds, I will inform you. The third packet is still here waiting an opportunity to be sent to Fuhchau.

I have distributed the rest of the seeds, 218 parcels in all, to a seedsman and florist who has formerly received such parcels and planted them himself or distributed the seeds among the gardeners who raise vegetables for market. I gave him the Chinese names of all those I had, and shall endeavor to collect through him all the common seeds and fruits grown hereabouts.

With respect to the articles required or suggested by Mr. Burke in exchange for these seeds, and to the information he wishes respecting agriculture, I have time now only to make a few general remarks. I have mentioned to the gentlemen at Ningpo and Shanghai, that the seeds of the tallow tree (*Stillingia sebifera*) are particularly wanted, and think they will be able easily to collect them; the plant grows in this region, but its seeds furnish little tallow, perhaps because the warmth of the climate induces a different habit of the plant, prejudicial to the deposite of this natural covering of the seed. They have been, moreover, requested to get some jars of the seeds of the Shantung cabbage, and send them down.

The various processes attending the hatching and rearing of silk worms, preparation of silk, and cultivation of the mulberry, have been carefully translated from native works upon the subject, by Stanislaus Julien, of Paris; and the manipulations of the Chinese in the tree have been described by De Guignes, formerly French consul at Canton; both their works can be obtained in Paris. Almost every point relating to the agriculture of this people has been investigated by the latter, whose overland travels to Pekin furnished him with unusual opportunities of observing the crops of the country, and most of the modes of raising them. Mr. Fortune's book, lately published, also contains some valuable details on floriculture. The Chinese are rather gardeners than farmers, and one reason why they produce so much, and support such a large population, is the interest so large a portion of the population have in the soil, inducing them to cultivate it themselves, and the large proportion of vegetables in their food. They have no inducement to learn any of the principles of agriculture from us, inasmuch as the plats of ground belonging to individuals are too small to allow many experiments, and no one has the means of showing them the advantages of other modes by actual experiment.

Among the vegetable productions of China, there are several which might be carried to the United States with a fair prospect of introducing them, if proper means were employed, and funds furnished for sending them. The camphor tree, the tallow tree, and the varnish tree, would probably succeed in the Southern States, and all of them prove sources of wealth or convenience. The oil-bearing camellia is largely grown in the provinces of Keanyse and Hoonan, for the oil in the seeds, which is obtained by pressure, and used for culinary purposes and in the arts; this plant would be of use in furnishing a vegetable oil serviceable in domestic life. All these plants are grown at a distance from the coast, and at present more expense would be required in procuring them; but, if their utility here is an index of their probable uses in America, money and care would be well bestowed in obtaining them.

Accounts of the condition of laboring men, their wages, rank in society, and skilfulness, requested by Mr. Burke, can be found in the works of De Guignes and Sir John Davis, both of whom are trustworthy, and their writings easily to be obtained.

With great respect, I have the honor to be yours, truly,

S. WELLS WILLIAMS.

His Excellency JOHN W. DAVIS, &c., &c.

APPENDIX No. 15.—HOME TRADE, &c.

Average prices of agricultural products for the four quarters of the year 1848, at New York, New Orleans, Buffalo, Chicago, St. Louis, and Cincinnati.

Cities.	Ashes, pots.—Per 100 pounds.		Ashes, pearls.—Per 100 pounds.		Bale rope.—Per pound.		Bark, quercitron.—Per ton.		Beans, white.—Per bushel.		Beeswax, American, yellow.—Per lb.	
FIRST QUARTER.												
New York	$5 79⅓ to	5 89⅔	$7 75 to	7 81	$0 05⅔ to	$0 07⅓	$35 00 to	38 00	$0 75 to	1 33⅔	$0 22 to	$0 25
New Orleans	No return has been		received from New		Orleans.							
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	–	76⅔		
St. Louis	–	–	–	–	–	–	–	–	1 73	1 91⅔		
Cincinnati	5 00	5 75	7 25	7 50	7	7¼	–	–	50	70	18	20
SECOND QUARTER.												
New York	5 08⅓	5 16⅓	6 16⅔	6 29	6	8	30 00	31 00	75	1 38	20	25
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	70	77⅓		
St. Louis	–	–	–	–	–	–	–	–	1 36⅔	1 43⅔		
Cincinnati	4 50	5 00	6 91⅔	6 25	7	7¼	–	–	50	70	18	20
THIRD QUARTER.												
New York	5 39⅔	5 47⅔	5 99⅔	6 10⅓	6	8	30 00	31 00	75	1 19⅓	19	22
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	70	75		
St. Louis	–	–	–	–	–	–	–	–	1 28⅔	1 51⅔		
Cincinnati	3 00	5 25	4 87½	5 25	7	7¼	–	–	50	75	15⅓	17
FOURTH QUARTER.												
New York	5 87	6 00	6 12	6 19	6	8	26 00	28 00	75	1 25	19	22
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	62	75		
St. Louis	–	–	–	–	–	–	–	–	1 11⅔	1 31		
Cincinnati	4 50	5 00	5 50	5 75	7	7¼	–	–	50	75	15⅓	17

Average prices of agricultural products—Continued.

Cities.	Bolt rope.—Per pound.		Bones, ground.—Per bushel.		Bristles, American Per pound.		Butter, table.—Per pound.		Butter, shipping.—Per pound.		Candles, mould, tallow.—Per pound.	
FIRST QUARTER.												
New York	$0 11 to	$0 12½	$0 45 to	$0 55	$0 25 to	$0 65	$0 15 to	$0 25	$0 09 to	$0 15	$0 12 to	$0 14
New Orleans	No return has been received from New Orleans.											
Buffalo.												
Chicago	–	–	–	–	–	–	11	14				
St. Louis.												
Cincinnati	–	–	–	–	–	–	25	30	14	17	–	10
SECOND QUARTER.												
New York	11	12½	45	55	25	65	15	25	9	15	11⅓	13⅓
New Orleans.												
Buffalo	–	–	–	–	–	–	12⅛					
Chicago	–	–	–	–	–	–	11	13				
St. Louis.												
Cincinnati	–	–	–	–	–	–	25	30	14⅛	16⅓	10	10¼
THIRD QUARTER.												
New York	11	12½	45	55	25	65	15	25	9	15	11	13
New Orleans.												
Buffalo	–	–	–	–	–	–	11½	–				
Chicago	–	–	–	–	–	–	8	10				
St. Louis.												
Cincinnati	–	–	–	–	–	–	12	18⅓	8⅔	10⅔	10	10⅔
FOURTH QUARTER.												
New York	11	12½	45	55	25	65	15	25	9	15	11	13
New Orleans.												
Buffalo	–	–	–	–	–	–	11½	–				
Chicago	–	–	–	–	–	–	9	–				
St. Louis.												
Cincinnati	–	–	–	–	–	–	15	20	11	12½	10	10¾

Average prices of agricultural products—Continued.

Cities.	Candles, sperm.—Per pound.		Candles, stearine.—Per pound.		Cheese.—Per 100 pounds.		Coal, anthracite.—Per 2,000 pounds.		Cordage, American.—Per pound.		Cotton.—Per 100 pounds.	
FIRST QUARTER.												
New York	$0 25 to	$0 38	$0 20 to	$0 25	$5 00 to	$10 00	$5 00 to	$6 00	$0 11 to	$0 13	$6 00 to	$10 00
New Orleans	No return has been received from New Orleans.											
Buffalo.												
Chicago	–	–	–	–	$4 00 to	$7 00						
St. Louis.												
Cincinnati	–	–	$0 00 to	$0 22	8 00	8 50	–	–	–	–	6 50	7 00
SECOND QUARTER.												
New York	$0 25 to	$0 38	20	25	5 00	10 00	5 00	6 00	11	13	4 66⅔	5 66⅔
New Orleans.												
Buffalo	–	–	–	–	–	7 38						
Chicago	–	–	–	–	4 00	7 00						
St. Louis.												
Cincinnati	–	–	–	22	8 50	8 50	–	–	–	–	5 00	6 33⅓
THIRD QUARTER.												
New York	25	38	20	25	5 00	10 00	4 50	5 50	11	13	5 83⅓	9 00
New Orleans.												
Buffalo	–	–	–	–	–	5 65⅓						
Chicago	–	–	–	–	4 00	7 00						
St. Louis.												
Cincinnati	–	–	–	22	5 83⅓	6 12¼	–	–	–	–	4 33⅓	5 91⅔
FOURTH QUARTER.												
New York	25	38	20	25	5 00	10 00	4 50	5 50	10	12	5 00	9 00
New Orleans.												
Buffalo	–	–	–	–	–	4 75						
Chicago	–	–	–	–	4 00	7 00						
St. Louis.												
Cincinnati	–	–	21	22	6 25	6 50	–	–	–	–	4 50	6 00

Average prices of agricultural products—Continued.

Cities.	Cotton bagging, American hemp.—Per yard.		Feathers.—Per pound.		Flax, American.—Per pound.		Flour, northern and western.—Per barrel.		Flour, fancy.—Per barrel.		Flour, southern.—Per barrel.	
FIRST QUARTER.												
New York	$0 15 to	$0 16	$0 30 to	$0 40	$0 07$\frac{1}{2}$ to	$0 09	$6 06$\frac{1}{3}$ to	$6 50	$6 50 to	$7 00	$6 04$\frac{1}{2}$ to	$6 33$\frac{2}{3}$
New Orleans	No return has been received from New Orleans.											
Buffalo.							–	–				
Chicago	–	–	$0 00 to	$0 33	–	–	4 25	4 50				
St. Louis	–	–	–	–	–	–	4 38	4 65				
Cincinnati	–	–	27	28	–	–	4 50	4 55				
SECOND QUARTER.												
New York	$0 15 to	$0 16	30	40	$0 08$\frac{2}{3}$ to	$0 09$\frac{1}{3}$	6 00	6 31	6 50	7 00	6 00	6 31
New Orleans.												
Buffalo	–	–	–	–	–	–	4 93$\frac{1}{2}$	–				
Chicago	–	–	23	32$\frac{1}{2}$	–	–	4 50	4 75				
St. Louis	–	–	–	–	–	–	4 04$\frac{2}{3}$	4 22				
Cincinnati	–	–	28$\frac{1}{3}$	29	–	–	4 06	4 33$\frac{1}{3}$				
THIRD QUARTER.												
New York	15	16	30	40	8	9	5 00	5 79	6 00	6 50	5 00	5 79
New Orleans.												
Buffalo	–	–	–	–	–	–	4 70$\frac{1}{2}$	–				
Chicago	–	–	28	32	–	–	4 00	4 50				
St. Louis	–	–	–	–	–	–	3 73	4 11$\frac{1}{3}$				
Cincinnati	–	–	28	29	–	–	3 92$\frac{1}{2}$	4 05				
FOURTH QUARTER.												
New York	15	16	30	40	8	9	5 25	5 87	6 00	6 50	5 25	5 87
New Orleans.												
Buffalo	–	–	–	–	–	–	4 52$\frac{1}{2}$	–				
Chicago	–	–	–	33	–	–	4 00	4 50				
St. Louis	–	–	–	–	–	–	4 11$\frac{1}{3}$	4 31$\frac{2}{3}$				
Cincinnati	–	–	30	31	–	–	3 76$\frac{2}{3}$	3 82$\frac{1}{2}$				

Average prices of agricultural products—Continued.

Cities.	Flour, Richmond city mills.—Per barrel.		Flour, buckwheat.—Per 100 pounds.		Flour, Rye.—Per barrel.		Grain, wheat, western.—Per bushel.		Grain, wheat, southern.—Per bushel.		Grain, rye.—Per bushel.	
FIRST QUARTER.												
New York	$7 44	to $7 50	–	–	$4 08⅓	to $4 25	$1 21⅔	to $1 41⅔	$1 13½	to $1 28⅓	$0 84	to $0 88
New Orleans	No return has been		received from New		Orleans.							
Buffalo												
Chicago	–	–	$1 25	to $1 37	–	–	85	90				
St. Louis	–	–	–	–	–	–	65⅓	87½	–	–	43	47⅓
Cincinnati	–	–	–	–	–	–	90	–	–	–	55	60
SECOND QUARTER.												
New York	6 64⅔	6 75⅓	–	–	3 50	3 75	1 35	1 40	1 09⅓	1 25	73	74
New Orleans												
Buffalo	–	–	–	–	–	–	1 04					
Chicago	–	–	–	–	–	–	85	88½				
St. Louis	–	–	–	–	–	–	57	81⅔	–	–	37½	40
Cincinnati	–	–	–	–	–	–	85	90	–	–	53	60
THIRD QUARTER.												
New York	6 75	6 96	–	–	3 74⅔	3 91⅔	1 07⅓	1 27	1 05	1 25	69⅔	70⅔
New Orleans												
Buffalo	–	–	–	–	–	–	93⅓					
Chicago	–	–	–	–	–	–	65	75				
St. Louis	–	–	–	–	–	–	49⅓	72	–	–	39⅓	41⅓
Cincinnati	–	–	–	–	–	–	68⅓	75⅓	–	–	49	52½
FOURTH QUARTER.												
New York	7 00	7 25	–	–	3 12	4 25	1 10	1 31	–	–	65	67
New Orleans												
Buffalo	–	–	–	–	–	–	88½					
Chicago	–	–	1 25	–	–	–	60	70				
St. Louis	–	–	–	–	–	–	53⅓	85⅓	–	–	37	39⅓
Cincinnati	–	–	–	–	–	–	–	75	–	–	50	55

Average prices of agricultural products—Continued.

Cities.	Grain, corn, northern.—Per bushel.	Grain, corn, southern.—Per bushel.	Grain, barley.—Per bushel.	Grains, oats, northern.—Per bushel.	Grain, oats, southern.—Per bushel.	Guano —Per bushel.
FIRST QUARTER.						
New York	\$0 63 to \$0 $67\frac{2}{3}$	\$0 $59\frac{1}{3}$ \$0 61	\$0 78 to \$0 85	\$0 48 \$0 $50\frac{1}{3}$	\$0 $41\frac{1}{3}$ to \$0 $45\frac{1}{3}$	\$2 50 to \$3 00
New Orleans	No return has been	received from New	Orleans.			
Buffalo						
Chicago	– 33	– –	– –	– $22\frac{2}{3}$		
St. Louis	– –	$23\frac{1}{2}$ $25\frac{1}{3}$	$31\frac{1}{2}$ $35\frac{2}{3}$	– –	20 25	
Cincinnati	24 28	– –	35 40	22 27		
SECOND QUARTER.						
New York	56 $57\frac{2}{3}$	$52\frac{1}{3}$ 55	$76\frac{1}{3}$ $85\frac{2}{3}$	$43\frac{1}{3}$ $48\frac{2}{3}$	40 45	2 50 3 00
New Orleans						
Buffalo	39 –	– –	– –	35		
Chicago	37 –	– –	– –	29 $32\frac{1}{2}$		
St. Louis	– –	$17\frac{3}{8}$ 19	26 31	– –	19 20	
Cincinnati	25 28	– –	35 40	24 27		
THIRD QUARTER.						
New York	60 66	$56\frac{2}{3}$ 61	$61\frac{2}{3}$ $66\frac{2}{3}$	$36\frac{1}{3}$ 41	$36\frac{1}{3}$ 41	
New Orleans						
Buffalo	$44\frac{1}{2}$ –	– –	– –	$29\frac{1}{3}$		
Chicago	30 33	– –	– –	25 28		
St. Louis	– –	24 $25\frac{2}{3}$	$28\frac{1}{2}$ $37\frac{2}{3}$	– –	$17\frac{3}{8}$ $19\frac{2}{3}$	
Cincinnati	$29\frac{1}{8}$ $33\frac{1}{3}$	– –	37 $41\frac{1}{3}$	25 $27\frac{1}{3}$		
FOURTH QUARTER.						
New York	65 74	65 70	62 65	27 35		
New Orleans						
Buffalo	47 –	– –	– –	26		
Chicago	$32\frac{1}{2}$ 35	– –	– –	18 20		
St. Louis	– –	29 32	$42\frac{1}{3}$ $58\frac{1}{3}$	– –	20 $21\frac{1}{3}$	
Cincinnati	$27\frac{1}{3}$ $31\frac{2}{3}$	– –	$48\frac{1}{3}$ $53\frac{1}{3}$	26 $28\frac{2}{3}$		

Average prices of agricultural products—Continued.

Cities.	Hay, in bales.—Per 100 pounds.		Hemp, Russia, clean.—Per ton.		Hemp, American, water rotted.—Per ton.		Hemp, American, dew rotted.—Per ton.		Hides, dry, southern.—Per ton.		Hops.—Per pound.	
FIRST QUARTER.												
New York	$0 65	to $0 70	$225 00	to $235 00	$160 00	to $220 00	$140 00	to $200 00	$0 07	to $0 09	$0 05	to $0 08
New Orleans	No return has been		received from New		Orleans.							
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	7	8§		
St. Louis	–	–	–	–	–	–	84 66$\frac{2}{3}$	93 66$\frac{2}{3}$				
Cincinnati	12 00	15 00*	12 00†	–	5 00	5 50‡	–	–	7	7$\frac{1}{2}$§	5	8
SECOND QUARTER.												
New York	65	51	225 00	231 66$\frac{2}{3}$	160 00	220 00	140 00	200 00	6	7$\frac{2}{3}$	4$\frac{2}{3}$	7$\frac{2}{3}$
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	7	8§		
St. Louis	–	–	–	–	–	–	72 66$\frac{2}{3}$	80 83$\frac{1}{3}$				
Cincinnati	12 00	15 66$\frac{2}{3}$*	12 00	12 50†	5 00	5 50‡	–	–	7	7$\frac{1}{2}$	5$\frac{2}{3}$	7$\frac{1}{3}$
THIRD QUARTER.												
New York	40	45	216 66$\frac{2}{3}$	223 33$\frac{1}{3}$	160 00	220 00	140 00	200 00	5$\frac{1}{3}$	6$\frac{1}{3}$	4	8
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	6	7§		
St. Louis	–	–	–	–	–	–	87 33$\frac{1}{3}$	97 66$\frac{2}{3}$				
Cincinnati	9 66$\frac{2}{3}$	12 66$\frac{1}{3}$*	11$\frac{1}{2}$	12$\frac{1}{2}$†	4 91$\frac{2}{3}$	5 16$\frac{2}{3}$‡	–	–	7	7$\frac{1}{2}$§	6$\frac{2}{3}$	8$\frac{2}{3}$
FOURTH QUARTER.												
New York	45	50	195 00	200 00	160 00	220 00	140 00	200 00	6	7	4	12
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	–	–	6	7§		
St. Louis.												
Cincinnati	12 00	13 00*	10 50	10 33$\frac{1}{3}$†	5 75	6 00‡	99 16$\frac{2}{3}$	109 91$\frac{2}{3}$	7	7$\frac{1}{2}$	9	10

* Per ton. † Manilla, per cwt. ‡ Brown, per cwt. § Per pound.

Average prices of agricultural products—Continued.

Cities.	Horns.—Per 100.		Lead, pig.—Per 100.		Lead, sheet and bar.—Per pound.		Meal. corn—Per barrel.		Meal. corn.—Per hogshead.		Molasses, New Orleans.—Per gallon.	
FIRST QUARTER.												
New York	$2 00 to	$10 00	$4 25 to	$4 50	$0 04½ to	$0 05½	$2 73 to	$3 16⅔	$15 16⅔ to	$15 66⅔	$0 27 to	$0 29
New Orleans	No return has been		received from	New	Orleans.							
Buffalo.												
Chicago	–	–	–	–	–	–	—	75‡				
St. Louis	–	–	3 93⅓	4 00								
Cincinnati	–	–	4 00	4 25	4¼	4½	30	35§	–	–	25½	28
SECOND QUARTER.												
New York	2 00	10 00	4 00	4 14	5⅝	6⅔†	2 27	2 66⅔	12 66⅓	13 04	23⅓	26
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	—	77½‡				
St. Louis	–	–	3 38	3 41⅓								
Cincinnati	–	–	3 79	3 89	4¼	4⅜	30	35§	–	–	23	25⅓
THIRD QUARTER.												
New York	2 00	10 00	4 10⅔	4 20⅔	5	6†	2 91⅓	3 12⅓	12 50	13 00	33	25⅓
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	70	75‡				
St. Louis	–	–	3 65	3 70								
Cincinnati	–	–	4⅓*	–	4 5-24	4 5-12	35⅓	38⅓§	–	–	26½	27⅓
FOURTH QUARTER.												
New York	2 00	10 00	4 06	4 12	5	7†	3 12	3 38	12 50	13 00	23	28
New Orleans.												
Buffalo.												
Chicago	–	–	–	–	–	–	75	80‡				
St. Louis	–	–	3 75⅔	3 81								
Cincinnati	–	–	4⅓*	–	4¼	4½	35	45§	–	–	24	27¼

* Per pound. † Lead pipes for pumps, &c. ‡ Per 100 pounds. § Per bushel.

Average prices of agricultural products—Continued.

Cities.	Mustard, American.—Per pound.		Naval stores, tar.—Per barrel.		Naval stores, pitch.—Per barrel.		Naval stores, rosin.—Per barrel.		Turpentine —Per barrel.		Spirits turpentine, southern.—Per gallon.	
FIRST QUARTER.												
New York	$0 16 to	$0 31	$1 91⅔ to	2 16⅔	$0 81 to	1 00	$0 65⅓ to	$0 76⅔	$2 54½ to	2 83⅓	$0 37½ to	$0 41
New Orleans	No return has been	received from	New Orleans.									
Buffalo.												
Chicago.												
St. Louis.												
Cincinnati	*2 00	2 50	4 00	4 50	3 50	3 75	2 50	2 75	†50	75	50	52
SECOND QUARTER.												
New York	16	31	1 75	2 00	79	1 00	68⅓	78⅓	2 50	2 75	33	35⅓
New Orleans.												
Buffalo.												
Chicago.												
St. Louis.												
Cincinnati	*2 00	2 50	3 50	4 00	3 50	3 75	2 50	2 75	†50	75	50	52
THIRD QUARTER.												
New York	16	31	1 87½	2 12½	75	1 00	80	90	2 66⅔	2 91⅔	36⅓	39
New Orleans.												
Buffalo.												
Chicago.												
St. Louis.												
Cincinnati	*1 50	1 74	3 50	4 00	3 50	3 75	2 50	2 75	†50	75	43⅓	46
FOURTH QUARTER.												
New York	16	31	2 00	2 25	1 25	1 75	1 19	1 25	2 50	3 00	34	35
New Orleans.												
Buffalo.												
Chicago.												
St. Louis.												
Cincinnati	*1 50	1 74	3 50	4 00	3 50	3 75	2 50	2 75	†50	75	40	43

* Per bushel. † Soft.

Average prices of agricultural products—Continued.

Cities.	Oil, linseed, American.—Per gallon.	Oil, castor.—Per gallon.	Oil, lard.—Per gallon.	Oil cake.—Per 100 pounds.	Peas, field.—Per bushel.	Plaster of Paris —Per ton.
FIRST QUARTER.						
New York	$0 61⅓ to $0 64	$1 20 to 1 25	$0 80 to $0 85	$1 25 to 1 50	$1 00 to 1 33⅓	$2 25 to 3 00
New Orleans	No return has been received from New Orleans.					
Buffalo.						
Chicago	– –	– –	87 1 00			
St. Louis.						
Cincinnati	52 55	1 12 1 25	58 60			
SECOND QUARTER.						
New York	60⅔ 61⅔	1 50 1 66½	61⅔ 66⅔	1 08⅓ 1 26⅔	1 00 1 62	2 25 3 00
New Orleans.						
Buffalo.						
Chicago	– –	– –	87 1 00			
St. Louis.						
Cincinnati	49½ 55	1 16⅓ 1 25	55 60			
THIRD QUARTER.						
New York	59⅔ 60⅔	1 50 1 70	61⅔ 66⅔	1 00 1 15	1 00 1 62	2 25 3 00
New Orleans.						
Buffalo.						
Chicago	– –	– –	75 87			
St. Louis.						
Cincinnati	51⅓ 54	1 33⅔ 1 60	49⅓ 52½			
FOURTH QUARTER.						
New York	51 53	1 25 1 50	65 70	1 00 1 15	75 1 25	2 25 3 00
New Orleans.						
Buffalo.						
Chicago	– –	– –	75 87			
St. Louis.						
Cincinnati	51½ 53	1 50 1 60	50 55			

Average prices of agricultural products—Continued.

Cities.	Plaster of Paris, ground, in bbls of 300 pounds.	Provisions—beef, mess.—Per barrel.	Provisions—beef, prime.—Per barrel.	Provisions—beef, smoked.—Per barrel	Provisions—beef, rounds, in pickle.—Per pound.	Provisions—pork, mess.—Per barrel.
FIRST QUARTER.						
New York	$1 12 to $1 25	$8 25 to $12 00	$5 25 to $7 50	$0 07 to $0 11	$0 05 to $0 07	$10 00 to $10 33⅓
New Orleans	No return has been	received from New	Orleans.			
Buffalo.						
Chicago	– –	6 00 7 00	– –	– –	– –	– 8 66⅔
St. Louis						
Cincinnati	– –	– –	– –	– –	– –	7 75 8 00
SECOND QUARTER.						
New York	1 12 1 25	8 00 11 00	5 25 7 50	7 11	5 7	9 75 14 00
New Orleans.						
Buffalo	– –	4 75* –	– –	– –	– –	9 18 –
Chicago	– –	6 00 7 00	– –	– –	– –	7 50 8 50
St. Louis.						
Cincinnati	– –	– –	– –	– –	– –	7 75 7 00
THIRD QUARTER.						
New York	1 12 1 25	9 00 13 16⅔	5 25 7 50	6 11⅓	4 6	9 75 12 33⅓
New Orleans.						
Buffalo	– –	4 83⅓* –	– –	– –	– –	10 90 –
Chicago	– –	6 00 7 00	– –	– –	– –	8 00 9 00
St. Louis.						
Cincinnati	– –	– –	– –	– –	6 00 8 00†	8 83⅓ 9 16⅔
FOURTH QUARTER.						
New York	1 12 1 25	9 00 13 50	5 00 7 50	6 12	4 6	9 75 13 00
New Orleans.						
Buffalo	– –	4 75* –	– –	– –	– –	11 71 –
Chicago	– –	6 00 7 00	– –	– –	– –	9 25 –
St. Louis.						
Cincinnati	– –	– –	– –	– –	6 00 8 00†	9 00 9 50

* Slaughtered; per 100 pounds. † Dried; per cwt.

Average prices of agricultural products—Continued.

Cities.	Provisions—pork, prime.—Per barrel		Provisions—lard. Per 100 pounds.		Provisions—bacon, sides, smoked.—Per pound.		Provisions—bacon, in pickle.—Per lb		Provisions—hams, smoked.—Per 100 pounds.		Provisions—hams, pickled.—Per lb.	
FIRST QUARTER.												
New York	$6 50 to $9 33⅓		$7 00 to $9 00		$0 06 to $0 08		$0 05 to $0 07		$3 00 to $13 00		$0 06 to $0 10	
New Orleans	No return has been received from New Orleans.											
Buffalo.												
Chicago	–	–	5 00	6 00								
St. Louis.												
Cincinnati	5 75	6 00	5 75	6 00*	3½	3⅝	7	8†				
SECOND QUARTER.												
New York	6 50	9 00	6 16⅔	8 00	6	8	5	7	8 00	13 00	6	10
New Orleans.												
Buffalo	–	–	–	5 81⅓	–	–	–	–	–	5 30½		
Chicago	–	–	5 00	6 00								
St. Louis.												
Cincinnati	5 50	6 00	5 50	6 00*	3	3¼	7	8†				
THIRD QUARTER.												
New York	6 06⅔	9 33⅓	7 00	8 06⅔	–	–	–	–	5 09	9 00	4	7
New Orleans.												
Buffalo	–	–	–	6 87½	–	–	–	–	–	5 90⅔		
Chicago	–	–	5 00	6 00								
St. Louis.												
Cincinnati	6 58⅓	6 83⅓	7 00	8 16⅔*	3½	3¾	8	9†	7 16⅔	8 00		
FOURTH QUARTER.												
New York	7 00	10 00	8 00	9 50	3	4½	3	4	500	9 00	4	7
New Orleans.												
Buffalo	–	–	–	7 21½	–	–	–	–	–	6 50		
Chicago	–	–	5 50	6 50								
St. Louis.												
Cincinnati	6 75	7 00	6 58⅓	7 00	5¾	6½	9	10†				

* Prime leaf. † Extra.

Average prices of agricultural products—Continued.

Cities.	Provisions—shoulders, smoked.—Per pound.		Provisions—shoulders, pickled.—Per pound.		Rice.—Per 100 pounds.		Salt.—Per sack.		Salt, common.—Per bushel.		Seeds, clover.—Per pound.	
FIRST QUARTER.												
New York	$0 06 to	$0 09	$0 05 to	$0 07	$3 00 to	$4 00	$1 $43\frac{1}{3}$ to	$1 $53\frac{1}{3}$	$0 20 to	$0 35	$0 05 to	$0 08
New Orleans	No return has been received from New Orleans.											
Buffalo.												
Chicago	–	–	–	–	–	–	— —	1 $66\frac{2}{3}$	†2 25	— —	—	$12\frac{1}{2}$
St. Louis.												
Cincinnati	–	–	–	–	4 50	5 00	*1 50	1 62	‡32	35	§3 60	3 75
SECOND QUARTER.												
New York	6	9	5	7	3 00	4 00	1 $36\frac{2}{3}$	1 $46\frac{2}{3}$	20	35	6	8
New Orleans.												
Buffalo	–	–	–	–	–	–	–	–	–	–	§3 50	
Chicago	–	–	–	–	–	–	†1 75	1 87	†1 50		—	12
St. Louis.												
Cincinnati	–	–	–	–	4 50	5 00	*1 50	1 62	‡32	35	§3 60	3 75
THIRD QUARTER.												
New York	$3\frac{2}{3}$	$4\frac{2}{3}$	3	4	3 00	4 00	1 25	1 45	20	35	5	7
New Orleans.												
Buffalo	–	–	–	–	–	–	–	–	–	–	§3 $66\frac{2}{3}$	
Chicago	–	–	–	–	–	–	†1 38	1 50	†1 62	1 75		
St. Louis	–	–	–	–	–	–	–	–	–	–	—	$12\frac{1}{2}$
Cincinnati	2	—	–	–	5 $41\frac{2}{3}$	5 $66\frac{2}{3}$	*1 50	1 60	‡35	57	§3 50	3 75
FOURTH QUARTER.												
New York	4	5	3	4	3 00	4 00	1 25	1 45	20	35	5	7
New Orleans.												
Buffalo	–	–	–	–	–	–	–	–	–	–	§3 50	
Chicago	–	–	–	–	–	–	†1 38	1 50	†1 62	2 $37\frac{1}{2}$	—	$12\frac{1}{2}$
St. Louis.												
Cincinnati	–	–	–	–	5 25	5 50	*1 50	1 60	‡40	45	§3 50	4 00

* Liverpool blown. † Per barrel. ‡ Turk's Island. § Per bushel.

Average price of agricultural products—Continued.

Cities.	Seed, timothy.—Per bushel.		Seed, flax, clean. Per bushel.		Seed, flax, rough. Per bushel.		Soda ash, containing 80 per cent. soda.—Per lb.		Soda, sulphate.—Per pound.		Sugar, New Orleans.—Per lb.		Sumac, American. Per ton.	
FIRST QUARTER.														
New York	$1 75 to	$3 50	$1 43⅓ to	$1 48⅓	$1 33⅓ to	$1 51⅔	3	–	$0 01	–	$0 04 to	$0 07	$35 00 to	$37 00
New Orleans	No return has been received from New Orleans.													
Buffalo														
Chicago	–	1 50	62	75										
St. Louis	–	–	80	84										
Cincinnati	1 50	3 00	–	80	–	–	*4½	5	–	–	4	5⅛		
SECOND QUARTER.														
New York	2 83⅓	4 00	1 40	1 45	1 30	1 35	3	–	1	–	2 5-6	5⅓	35 00	37 00
New Orleans														
Buffalo														
Chicago	–	–	62	75										
St. Louis	–	–	69½	73⅓										
Cincinnati	1 50	3 00	76⅔	81	–	–	*4½	5	–	–	4	5⅛		
THIRD QUARTER.														
New York	2 00	3 50	1 35	1 40	1 25	1 30	3	–	1	–	3	5⅓	35 00	37 00
New Orleans														
Buffalo														
Chicago	–	2 00	62	75										
St. Louis	–	–	67⅔	72⅔										
Cincinnati	1 50	2 50	80	83¾	–	–	*4½	5	–	–	4	5		
FOURTH QUARTER.														
New York	2 00	3 50	1 30	1 40	1 20	1 22	3	–	1	–	4	6	35 00	37 00
New Orleans														
Buffalo														
Chicago	1 50	1 75	62	75										
St. Louis	–	–	74⅓	79⅓										
Cincinnati	2 00	2 25	–	90	–	–	*4½	5	–	–	3¾	5¼		

* Sal. soda.

Average prices of agricultural products—Continued.

Cities.	Tallow.—Per pound.		Tobacco.—Per pound.		Whiskey, American.—Per gallon.		Wools, Saxony.—Per pound.		Wools, Merino.—Per pound.		Wools, half-blood. Per pound.		Wools, common. Per pound.	
FIRST QUARTER.														
New York	$0 03 to	$0 03	$0 02½ to	$0 03	$0 24 to	$0 25⅓	$0 55 to	$0 60	$0 50 to	$0 55	$0 20 to	$0 25	$0 18 to	$0 20
New Orleans	No return has been received from New Orleans.													
Buffalo.														
Chicago	–	–	–	–	–	–	–	–	24	27				
St. Louis	–	–	5 40	6 25†										
Cincinnati	7¼	7¾*	5	7‡	15¼	16⅝	–	–	20	30				
SECOND QUARTER.														
New York	8	8 1 6	2 5-6	8⅓	21⅗	23⅗	35	60	30	25	20	25	18	20
New Orleans.														
Buffalo	–	–	–	–	17	–	–	–	–	–	–	–	20	30
Chicago	–	–	–	–	–	–	–	–	20	23				
St. Louis	–	–	6 57	7 66⅔†										
Cincinnati	7¼	8*	5	7‡	15½	15⅜	–	–	20	30				
THIRD QUARTER.														
New York	7	8½	2¼	7	23	25½	35	60	28⅓	35	20	25	18	20
New Orleans.														
Buffalo	–	–	–	–	18⅔	–	–	–	–	–	–	–	20	30
Chicago	–	–	–	–	–	–	–	–	15	25				
St. Louis	–	–	7 46⅔	8 22⅓†										
Cincinnati	7	7½*	5	7‡	16	17½	–	–	16	25				
FOURTH QUARTER.														
New York	8	9	2¼	7	23	25	35	60	25	35	20	25	18	20
New Orleans.														
Buffalo	–	–	–	–	18⅓	–	–	–	–	–	–	–	20	30
Chicago	–	–	–	–	–	–	–	–	15	25				
St. Louis	–	–	7 51⅓	8 63⅓†										
Cincinnati	7	7½*	5	7‡	17	17½	–	–	11⅓	26½				

* Tried. † Per 100 pounds. ‡ Twist.

The following tables, like the one preceeding, relate to the interior trade and commerce of the country. The materials we draw from many sources, mostly, however, from the public journals; the most prominent of which are the commercial lists of the principal cities. In some instances, they are specified; in others, not distinctly so. They are partly also given in detail, and partly in the totals or generals. The order of arrangement explains itself. More were prepared, and would have been inserted, but for want of room.

BOSTON.

Commerce of 1848, *&c.*

ARRIVALS.

The arrivals from foreign ports have been as follows:

	Ships.	Barques.	Brigs.	Schooners.	Total.
1848	243	310	902	1,646	3,101
1847	182	262	698	1,613	2,755
1846	146	213	531	1,162	2,052

CLEARANCES.

The foreign clearances have been as follows:

	Ships.	Barques.	Brigs.	Schooners.	Total.
1848	159	315	887	1,449	2,810
1847	116	228	626	1,556	2,526
1846	95	192	480	1,214	1,981

The coastwise arrivals and the clearances, as far as known, (as many are not entered at the custom-house,) have been as follows:

	Arrivals.	Clearances.
1848	6,118	3,187
1847	7,125	3,198
1846	6,775	2,672

IMMIGRANTS.

Arrived at the port of Boston, from January 1, 1848, to January 1, 1849, 921 vessels, with alien passengers on board, the total number of which is 25,527; and said passengers have been permitted to land, as follows: For 25,002, the proper agents paid $2 per head; for 525, bonds have been taken.

Total	25,527
There also arrived with the aforesaid, who were either by birth Americans, or who had been in this State before	3,141
Making the whole number inspected	28,668

ASHES.

The amount inspected in this State the past year has been as follows:

	Casks.	Pounds.
Total	448	212,895
Total—pot and pearl—1848	1,407	597,711
1847	1,225	541,631
1846	1,783	801,094

The stock now in dealers' hands is estimated at 300 casks pot and pearl, against 200 casks pot and 60 casks pearl in 1847.

COAL.

The receipts of foreign coal have been as follows:

	Tons.	Chalds.
Total—1848	5,795	41,303
1847	4,251	47,093
1846	5,233	21,127

The receipts of anthracite and Virginia have been as follows:

	Tons.	Bushels.
Total—1848	275,246	48,600
1847	261,259	127,525
1846	187,028	151,900

COFFEE.

Total—1848	pounds..	16,752,353
1847	do....	27,532,522
1846	do....	29,036,337

The export to foreign ports has been 45,827 bags this year, against 25,098 bags in 1847—an increase of 20,729 bags.

COTTON.

The import has been as follows:

Total—1848	bales..	239,958
1847	do...	198,932
1846	do...	193,549

The exports to foreign ports, for three years past, have been as follows:

1848	bales..	7,666
1847	do...	6,477
1846	do...	7,187

DOMESTIC GOODS.

Exports the past year:

	Bales and cases.	Value.
Total—1848	50,952	$2,266,392 84
1847	35,010	
1846	28,484	

DYEWOODS.

The imports for three years have been—

		1848.	1847.	1846.
Logwood	tons..	3,632	6,081	5,956
Do	pieces.	5,223	13,497	7,210
Fustic	tons..	388	490	380
Do	pieces.	12,843	12,837	8,443
Sapan wood	tons..	967	281	623

The exports for the two years have been—

		1848.	1847.
Logwood	tons..	3,619	5,429
Sapan wood	do...	797	234
Fustic	do...	562	109

FISH.

The import from the provinces show a falling off of 25,833 barrels, compared with last year.

1848	barrels..	33,265
1847	do....	59,098

Export for three years. The mackerel go principally to southern markets, and show an increase over the large export of last year.

		1848.	1847.	1846.
Codfish	drums..	3,281	3,469	6,060
Do.	boxes..	5,123	1,872	2,402
Do.	quintals.	70,917	123,783	96,131
Mackerel	barrels.	99,144	93,049	62,264
Herring	boxes..	30,242	37,083	26,100

FLOUR.

Receipts for flour in—

1848	barrels..	940,737
1847	do....	1,036,737
1846	do....	748,123

GRAIN.

Receipts of grain in—

		Corn.	Oats.
1848	bushels..	3,748,509	439,727
1847	do....	2,601,424	520,218
1846	do....	2,374,484	414,417

CORN MEAL.

The receipts and exports for three years past has been as follows:

		Receipts.	Exports.
1848	barrels	41,144	42,849
1847	do.	25,030	44,903
1846	do.	8,637	8,651

GRAIN.

The receipts have been as follows:

		Rye.	Wheat.
1848	bushels	65,189	336,247
1847	do.	50,256	171,127
1846	do.	17,160	83,962

The exports of corn and wheat for three years past have been as follows:

		Corn.	Wheat.
1848	bushels	518,886	21,249
1847	do.	568,025	14,853
1846	do.	191,254	5,090

HEMP.

The receipts have been as follows:

	Tons.	Bales.
1848	1,322	51,285
1847	928	45,834
1846	392	32,366

HOPS.

Export for two years to foreign ports has been as follows:

1848	bales	605
1847	do.	455

LEATHER.

The imports for the past three years were:

	Sides.	Bundles.
1848	582,053	25,791
1847	658,604	26,636
1846	603,730	24,346

In connexion with the above, the following statement shows the quantity of boots and shoes cleared at the custom-house, mostly for southern ports, for three years past:

1848	cases	79,118
1847	do.	72,424
1846	do.	67,887

MOLASSES.

The import has been as follows:

	Hogsheads.	Tierces.	Barrels.
Foreign	63,500	4,172	1,909
Coastwise	14,175	311	5,307
Total—1848	77,675	4,483	7,216
1847	hogsheads		81,232
1846	do.		71,595

Exported the past year:

	Hogsheads.	Tierces.	Barrels.
To foreign ports	3,874	179	160
coastwise	10,093	180	345
Total—1848	13,967	359	505
1847	29,586	2,700	1,253
1846	17,686	2,269	185

NAVAL STORES.

The receipts for three years are as follows:

		1848.	1847.	1846.
Rosin	barrels	9,825	10,141	20,901
Turpentine	do.	23,006	56,729	31,729
Spirits turpentine	do.	5,514	7,895	6,831
Pitch	do.	405	2,774	2,357
Tar	do.	19,959	16,228	16,542

Export for three years:

		1848.	1847.	1846.
Rosin	barrels	15,077	25,130	27,804
Spirits turpentine	do.	2,328	4,173	696
Tar	do.	6,192	5,857	5,889
Pitch	do.	5,440	5,168	4,301
Turpentine	do.	2,569	5,557	4,291

PROVISIONS.

The receipts have been as follows:

		1848.	1847.
Beef	barrels	23,053	28,442
Pork	do	97,890	70,874
Hams	casks	8,723	3,854
Hams	barrels	5,591	3,600
Lard	do.	52,619	31,646
Lard	kegs	44,726	58,667
Cheese	casks	7,239	10,795
Cheese	boxes	49,620	57,560
Cheese	tons	535	548

The exports have been as follows:

		1848.	1847.
Pork—foreign	barrels	18,460	25,431
coastwise	do.	7,652	7,442
Lard—foreign	do.	13,607	3,145
coastwise	do.	3,197	305
Lard—foreign	kegs	31,771	42,258
coastwise	do.	4,658	3,040
Beef—foreign	barrels	6,644	5,564
coastwise	do.	635	1,922
Cheese—foreign	boxes	6,233	13,807
coastwise	do.	503	502
Cheese—foreign	casks	200	354
coastwise	do.	24	8

RICE.

The receipts have been as follows:

1848	casks	11,447
1847	do.	9,727
1846	do.	10,185

The exports have been as follows:

To foreign ports	casks	4,388
coastwise ports	do.	143
Total—1848	do.	4,531
1847	do.	4,227
1846	do.	5,066

SALT.

The receipts have been:

Total—1848	bushels	1,566,584
1847	do.	1,370,976
1846	do.	494,771

SEEDS.

The receipts of linseed for three years past have been:

1848	bags	90,277
1847	do.	46,721
1846	do.	77,526

SUGAR.

The receipts have been:

Total—1848	43,621,063
1847	48,737,035
1846	29,556,570

SUMAC.

Imports for three years:

1848	bags	34,524
1847	do.	19,070
1846	do.	16,676

TALLOW.

The export of rendered for three years:

1848	barrels	3,244
1847	do.	4,339
1846	do.	3,438

TOBACCO.

The receipts for three years past have been:

	Hogsheads.	Bales.	Bxs. and kgs.
1848	2,112	4,514	32,013
1847	3,004	4,780	38,750
1846	1,381	4,410	33,442

The amount inspected in Boston for three years past has been as follows:

1848	hogsheads	1,664
1847	do	2,258
1846	do	1,012

The stock of leaf tobacco now in first hands is estimated at 1,100 hogsheads against 1,500 last year.

WOOL.

The receipts of domestic for three years past, by western railroad and water, have been:

1848	bales	17,698
1847	do.	19,618
1846	do.	24,272

The receipts of foreign for the same time have been:

	Bales.	Quintals.
1848	17,707	11,425
1847	4,759	26,630
1846	7,256	17,091

NEW YORK.

Commerce of the port.

IMPORTS.

	1846.	1847.	1848.
Free goods	$11,117,435	$7,751,407	$8,388,642
Specie	745,529	8,710,748	1,083,001
Dutiable goods	58,407,827	78,571,102	78,845,812
Cash received	17,159,578	20,256,264	20,172,938
Total	87,429,369	115,291,521	108,188,423

The imports of New York for three years past, from January 1 to December 31, are as follows:

Articles.	1848.	1847.	1846.
Brandy, half pipes	8,454	9,740	4,824
quarter casks and barrels	10,346	9,163	4,047
Coal, tons	47,259	54,094	35,116
Cocoa, bags	7,103	9,697	5,969
Cochineal, cerоons	1,256	64	430
Coffee, bags	418,003	427,470	382,846
Cotton, bales	379,902	239,252	322,456
Duck, bales	666	1,695	1,659
pieces	11,022	5,627	3,474
Earthenware, crates and casks	28,291	27,762	27,417
Figs, drums, &c.	87,002	144,776	35,893
Gin, pipes	4,285	2,974	2,356
Hemp, bales	52,624	57,186	43,623
tons	474	779	145
Hides, bales	881	967	694
number	968,738	290,454	566,446
Iron, bar, tons	29,903	31,236	15,390
pig, tons	65,058	32,175	17,371
sheet, hoop, &c, bundles	204,719	185,011	49,864

Imports of New York for three years past—Continued.

Articles.	1848.	1847.	134
Indigo, cases	1,410	1,083	997
ceroons	1,900	764	1,164
Lead, pigs	387,991	398,865	293,796
Molasses, hogsheads	76,047	76,971	73,822
tierces	6,576	5,931	5,168
barrels	42,333	21,473	23,557
Olive oil, casks	728	734	231
boxes and baskets	49,686	33,807	11,807
Pepper, bags	27,301	12,310	21,245
Pimento, bags	21,441	13,730	7,066
Rags, bales	23,313	15,463	11,730
Raisins, casks	9,903	7,896	7,962
boxes	390,931	260,457	351,732
drums	828	1,384	3,305
Rice, tierces	38,270	39,122	38,443
Rum, puncheons	2,804	1,725	1,725
Salt, bushels	2,009,897	1,949,913	1,303,663
Saltpetre, bags	19,565	21,395	9,295
Sugar, hogsheads	108,703	87,861	67,238
tierces	2,258	779	577
barrels	19,946	17,765	7,242
boxes	120,354	144,898	85,744
bags	90,088	24,215	37,652
Tin. banca, &c., slabs	54,291	26,750	21,801
plates, boxes	174,049	125,442	231,830
Tobacco, hogsheads	12,213	11,946	8,674
bales and ceroons	23,153	21,055	14,916
Wines, butts and pipes	846	725	1,289
hogsheads and half pipes	13,471	7,012	12,415
quarter casks	40,160	32,222	41,691
barrels	5,973	3,251	11,293
boxes	23,206	19,369	19,911
Wool, bales	15,873	1,008	19,514

HIDES.

Import of hides into the port of New York, from January 1 to December 31, 1848.

	Number.	Bales.
Total—1848	972,087	857
1847	990,305	978

Export of hides for the years—

1848	4,125
1847	15,236
1846	55,924

TOBACCO.

Below is a correct statement of the inspections of leaf tobacco at this port, from 1846, the time of the establishment of the inspection warehouse in this city, to the close of 1848, inclusive, and the stocks at the warehouse.

Inspections.

	Total hhds.
1846	7,669
1847	12,204
1848	11,022

Stocks.

	1846.	1847.	1848.
January	3,355	2,901	5,200
February	3,325	2,612	5,260
March	3,109	2,456	5,278
April	2,850	2,348	5,244
May	2,536	2,506	5,737
June	2,536	2,425	5,504
July	2,438	2,831	6,238
August	2,901	2,934	7,523
September	3,326	3,854	8,252
October	3,996	5,187	8,530
November	3,974	6,136	7,763
December	2,914	5,093	6,266

Import of manufactured tobacco at this port, from Jan. 1 to Dec. 31, inclusive, collected and arranged by Charles M. Connolly.

Import—	1848.	1847.
From Richmond .... packages	62,376	75,817
Petersburg	46,796	53,586
Norfolk	495	730
Other places	3,669	7,918
Total	113,336	138,051
Probable stock	30,000	36,000

Reeeipts in former years, from January 1 to December 31.

1846	112,118
1847	138,051

VIRGINIA TOBACCO AGENCY, *New York, December* 31, 1848.

Arrivals at New York from foreign ports, 1848.

We are indebted for the following statement of foreign arrivals at this port to the politeness of Mr. James Thorne, boarding officer United States revenue department, Whitehall:

	Steamers.	Ships.	Barques.	Brigs.	Galliots.	Schooners.
American	17	552	422	670	..	274
British	36	134	160	260	..	164
Bremen	..	17	45	31	2	3
Swedish	..	2	15	23	..	4
Hamburg	..	7	15	9		
French	1	14	15	10	..	2
Dutch	..	..	6	7		
Belgian	..	2	9	3		
Danish	..	5	5	14	..	1
Norwegian	..	1	10	16	..	3
Prussian	..	1	6	2	..	2
Sicilian	..	..	2	1		
Portuguese	..	..	..	11	..	1
Austrian	..	..	2			
Spanish	1	..	3	2		
Brazilian	..	..	1	4		
New Grenadian	..	..	2	2	..	4
Russian	..	..	1	1		
Neapolitan	..	..	..	1		
Sardinian	..	..	2	1		
Genoese	..	..	1	3		
Oldenburg	..	..	..	3	..	3
Oriental	..	..	1	..	..	1
Kniphausen	..	..	1			
Buenos Ayrean	..	..	1			
Lubeck	..	..	1			
Venezuelian	..	..	..	..	..	1
Hanoverian	..	..	1	3	..	2

Recapitulation of foreign arrivals at New York.

Steamers	55
Ships	736
Barques	725
Brigs	1,077
Galliots	2
Schooners	465
Total	3,060

	Foreign arrivals.	Of which British vessels.	Passengers arrived.
1841	2,118	334	57,337
1842	1,960	389	74,949
1843	1,832	271	46,302
1844	2,208	324	61,002
1845	2,044	276	82,960
1846	2,289	380	115,230
1847	3,147	730	166,110
1848	3,060	754	191,909

COASTWISE.

	Steamships.	Ships.	Barques.	Brigs.	Schooners.	Total.
January	1	33	17	55	261	367
February	3	24	20	48	291	386
March	5	31	29	68	396	529
April	4	27	23	56	364	474
May	4	26	24	68	373	495
June	9	20	21	67	597	714
July	8	24	11	67	475	585
August	7	22	13	53	446	541
September	5	17	18	53	554	647
October	8	22	9	66	450	555
November	9	21	19	64	511	624
December	5	24	14	47	414	504

Whole number, as above	6,421
Which, added to the foreign	3,060
Makes a total for the year of	9,481
Whole number last year	8,011
Increase	1,470

NOTE.—In the above there are no sloops included, which, if added to the many schooners from Virginia and Philadelphia with wood and coal, which, though consigned here, discharge their cargoes at Brooklyn, Williamsburg, Jersey City, and the adjacent towns on the Hudson, and are not boarded, owing to the remoteness of those points for general business, would make the number much greater. We estimate the *schooners* that arrive at the above places, and are not reported, at six per day, which we think a small estimate; this would give for the year 2,190 additional schooners to be added to the coasting trade—making the whole number of coastwise arrivals for 1848, 8,611.—*N. Y. Shipping and Com. List.*

PHILADELPHIA.

Commerce of 1848, &c.

IMPORTS OF COFFEE.

	Foreign.	Coastwise.	Total.
In 1848 bags	111,598	16,450	128,048
1847 do	72,404	49,628	121,432
1846 do	126,607	16,400	143,067

COTTON.

Import for the years........1846.... 37,637 1847.... 40,427 1848.... 45,149

HIDES.

Import from foreign ports for the years ... 1847...No.. 79,584 1848...No.. 55,786

LEAD.

Import for the years ....1847..pigs.. 139,650 1848..pigs.. 92,704

NAVAL STORES.

Import for the years.....................1847..bbls... 85,314 1848..bbls.. 63,952

RICE.

Receipts for the years....................1847...tcs.. 5,080 1848...tcs.. 6,484

SALT.

	Sacks.	Tons.	Bush.
Import from foreign ports for the year 1847....	111,420	2,646	182,640
1848....	93,870	2,368	166,584

IMPORT OF FOREIGN SUGAR.

	Hhds. and tcs.	Barrels.	Boxes.	Bags.
1848.....................	12,872	3,516	33,610	23,870
1847.....................	15,898	7,966	54,267	32,592
1846.....................	3,521	5,367	27,390	15,223

IMPORT OF FOREIGN MOLASSES.

	1846.	1847.	1848.
Hogsheads..............................	15,183	16,155	15,186
Tierces..............................	479	1,129	1,083
Barrels..............................	111	161	198

SUGAR AND MOLASSES RECEIVED COASTWISE.

	Sugar.		Molasses.	
	1847.	1848.	1847.	1848.
Hogsheads..........................	11,050	17,884	20	2,090
Tierces..........................	520	1,241	58	962
Barrels..........................	712	3,547	5,937	7,318
Bags..........................	–	14,675		

EXPORTS OF FLOUR, MEAL, GRAIN, &c.

The following table shows the exports of wheat and rye flour, corn meal, wheat, and corn, from this port, annually, for the last three years:

	1846.	1847.	1848.
Wheat flour.....................barrels....	366,610	420,684	179,507
Rye flour.....................do......	19,720	20,407	15,537
Corn meal.....................do......	144,857	300,531	140,014
Wheat.....................bushels....	245,136	523,538	207,092
Corn.....................do......	279,820	1,102,210	817,051
Rice ....tierces....	1,709	2,102	2,497
Ship bread.....................barrels....	35,731	45,538	25,680

LEATHER.

Shipments of leather to Boston the last three years have been as follows: In 1848, 53,000 sides; in 1847, 53,640 sides; in 1846, 44,070 sides.

INSPECTION OF BARK.

Amount inspected in three years and the stock in warehouse December 31, was as follows:

	Hogsheads.	Tierces.	Barrels.	Stock—hhds.
In 1848......................	3,241	331	8	150
1847......................	4,161	54	38	900
1846......................	2,862	4	–	150

INSPECTION OF BARK—Continued.

The quality inspected the past year was as follows:

	1st quality, No. 1.	1st quality, No. 2.	2d quality, No. 1.	Total.
Hogsheads	2,432	735	21	3,211
Tierces	120	211	–	331
Barrels	–	8	–	8

MEASUREMENT OF GRAIN, &c.

For the years ending December 31, 1848, 1847, and 1846—in bushels.

	Wheat.	Corn.	Rye.	Oats.	Beans.	Barley.	Seeds.	Coal, bit.	Salt.
1848..	723,694	1,302,313	46,900	327,733	450	62,554	9,770	357,827	200,474
1847..	947,598	1,093,264	78,372	369,171	676	38,210	7,528	268,760	546,438
1846..	983,924	665,178	30,829	350,942	3,495	40,339	15,864	348,261	237,463

INSPECTIONS OF BUTTER AND LARD.

		Packages.	Pounds.
1848—Extra butter	No. 1	19,176	491,613
Extra lard	No. 1	1,556	113,656
1847—Extra butter	No. 1	20,052	696,490
Extra butter	No. 2	130	3,044
Extra lard	No. 1	1,020	62,618

INSPECTION OF TOBACCO.

In 1846.....hhds.. 2,527 In 1847.....hhds.. 5,934 In 1848.....hhds.. 3,218

The inspections of 1848 comprise 2,868 hhds. Kentucky, 50 Ohio, and 300 Virginia—together, 3,218 hhds. The stock, January 1, 1849, consisted of 1,134 hhds. Kentucky, 50 Ohio, and 171 Virginia—together, 1,355 hhds. against 3,090 January 1, 1848.

CASH DUTIES.

Comparative statement of the cash duties received during the past three years.

1848....... $2,762,093 1847...... $2,904,748 1846...... 2,420,661

The following is the amount of duties received at this port for the month of December:

Duties received in December	$176,236 51	$151,196 58
previous months	2,728,462 66	2,610,896 53
Total for 1847	2,904,748 97	2,762,093 11
Total for 1848	2,762,093 11	
Decrease in 1848	142,655 86	

TONNAGE.

Statement of the vessels built and registered in this district during the year 1848.

	Ships.	Barques.	Brig.	Schrs.	Sl'ps.	St'mers.	Barges.	Total.
Number	2	7	1	23	7	6	127	178
Tons and 95ths.	2,044 36	1,344 81	192 41	3,046 01	129 29	1,831 16	8,204 04	17,283 18

INSPECTIONS OF LEATHER.

The law requiring the inspection of leather went into effect in May, 1843. The annual inspections since that time have been as follows:

In 1848.....sides..	301,261	In 1845.....sides..	231,507
1847.....do...	383,531	1844.....do...	233,377
1846.....do...	241,183	1843.....do...	164,000

Of the amount inspected in 1848, 196,183 sides were slaughtered, and 105,078 sides Spanish sole leather.

Inspections of beef and pork.

We have been furnished with the following statement of the quantity and quality of articles inspected by the inspector of salted provisions for the port of Philadelphia, for the years 1848 and 4847:

		1848.	1847.
India beef	tierces	160	684
Mess beef	barrels	3,766	3,482
Mess beef	half barrels	1,917	1,515
Prime beef	barrels	391	100
Prime mess pork	tierces	800	238
Prime mess pork	barrels	335	962
Prime pork		184	527
Family pork	half barrels	......	265
Sides	boxes	......	260

The total inspections during the past three years have been as follows:

		1848.	1847.	1846.
Beef	tierces	160	684	1,920
Beef	barrels	5,115½	4,309½	2,096
Pork	tierces	800	238	.....
Pork	barrels	519	1,621	14,705
Pork	boxes	.....	260	.....

[*Philadelphia Commercial List.*

Schuylkill navigation.

The following is a comparative statement of the articles which have arrived at and departed from Fairmount locks, Philadelphia, by this route during the years 1848, 1847, and 1846:

Descending.		1848.	1847.	1846.
Coal	tons	436,602	222,693	3,440
Lime		60,610	51,344	22,161
Limestone		37,624	29,043	19,948
Iron		17,622	10,896	5,[illegible]91
Lumber		11,275	14,246	2,944
Grain	bushels	205,893	28,824	18,218
Flour	barrels	47,050	65,932	44,092
Sand	tons	4,583	1,493	385
Iron ore		2,730	1,768	5,276
Wood		2,719	2,351	1,902
Shingles		2,043	1,411	......
Blooms and castings		2,034	1,491	......
Stone		2,687	1,039	590
Bituminous coal		1,345	739	326
Marble		1,092	1,496	2,560
Bricks		684	208	130
Charcoal		479	......	......
Nails		428	378	720
Whiskey		313	......	......
Clay		185	130	......
Rails and staves		157	157	......
Butter and eggs		149	107	150
Ice		134	......	......
Bark		112	173	......
Sundries		2,681	1,648	886
Total tonnage		598,488	355,160	76,438

Ascending.		1848.	1847.	1846.
Iron ore	tons	13,841	13,116	140
Limestone		11,979	15,910	990
Lumber		11,108	12,654	11,361

Schuylkill navigation—Continued.

Ascending.	1848.	1847.	1846.
Merchandise	9,415	6,113	......
Grain ... bushels..	292,564	244,090	163,640
Plaster ... tons..	4,571	1,969	4,291
Iron	7,485	3,684	1,453
Sand	2,056	3,139	538
Lime	1,859	1,662	240
Hay and straw	1,572	595	......
Flour ... barrels..	98,410	3,646	5,389
Stone ... tons..	1,232	2,762	1,255
Salt	894	1,032	1,081
Bricks	642	1,829	474
Wood	641	212	990
Clay and slate	560	722	155
Rails	412	473	1,455
Coal	411	684	971
Bituminous coal	394	......	......
Castings	319	......	......
Manure	308	......	......
Marble	300	398	440
Shingles and staves	284	194	360
Potatoes	169	......	......
Sundries	1,808	3,283	1,505
Total tonnage	81,086	77,347	32,350

BALTIMORE.

Exports of domestic produce for 1848.

TO SWEDISH WEST INDIES.

Beef	barrels	15	Biscuit	barrels	20
Pork	do	88	Indian corn	bushels	282
Flour	do	1,234	Lard	pounds	3,682
Indian meal	do	448	Butter	do	2,650

TO DANISH WEST INDIES.

Beef	barrels	504	Indian corn	bushels	2,294
Pork	do	311	Rice	tierces	149
Flour	do	23,353	Bacon	pounds	22,664
Indian meal	do	3,591	Lard	do	68,004
Biscuit	do	475	Butter	do	22,827
Biscuit	kegs	329	Cheese	do	19,333

TO HOLLAND.

Cotton	pounds	20,800	Flour	barrels	246
Bacon	do	8,750	Tobacco	hogsheads	12,071
Lard	do	116,953			

TO BELGIUM.

Tobacco, hogsheads ... 131

TO HANSE TOWNS.

Beef	barrels	440	Tobacco	hogsheads	13,978
Pork	do	1,436	Bacon	pounds	31,340
Flour	do	96	Lard	do	159,617
Rice	tierces	30			

Exports of domestic produce for 1848—Continued.

TO ENGLAND.

Beef	barrels	14,001	Cotton	pounds	5[illegible],053
Pork	do	27,353	Bacon	do	8,250,688
Flour	do	70,761	Lard	do	2,255,949
Indian meal	do	3,012	Cheese	do	136,610
Wheat	bushels	139,275	Tobacco	hogsheads	260
Indian corn	do	276,393			

TO IRELAND.

Beef	barrels	205	Wheat	bushels	33,778
Pork	do	2,188	Indian corn	do	304,730
Flour	do	5,383	Bacon	pounds	278,194
Indian meal	do	3,723	Lard	do	239,569
Biscuit	do	714	Cheese	do	11,813

TO GIBRALTAR.

Flour	barrels	1,197	Indian corn	bushels	6,505
Biscuit	do	40	Rice	tierces	10
Biscuit	kegs	20	Cotton	pounds	88,313

TO BRITISH GUIANA.

Beef	barrels	295	Indian meal	bushels	2,982
Pork	do	1,072	Tobacco	hogsheads	11
Flour	do	10,665	Bacon	pounds	3,769
Indian meal	do	2,650	Lard	do	17,814
Biscuit	do	1,619	Butter	do	10,597
Rice	tierces	55	Cheese	do	8,888

TO BRITISH WEST INDIES.

Beef	barrels	1,173	Wheat	bushels	988
Pork	do	5,446	Indian corn	do	60,685
Flour	do	81,865	Tobacco	hogsheads	90
Indian meal	do	24,446	Bacon	pounds	106,834
Biscuit	do	6,654	Lard	do	184,294
Biscuit	kegs	1,020	Butter	do	211,792
Rice	tierces	674	Cheese	do	88,357

TO BRITISH NORTH AMERICA.

Beef	barrels	228	Wheat	bushels	11,548
Pork	do	1.909	Indian corn	do	9,974
Flour	do	30,366	Bacon	pounds	20,469
Indian meal	do	8,898	Butter	do	43,963
Biscuit	do	2,891	Cheese	do	2,134
Rice	do	10			

TO FRANCE

Tobacco	hogsheads	5,661	Cotton	pounds	64,197

TO FRENCH WEST INDIES.

Beef	barrels	341	Lard	pounds	4,386
Flour	do	3,032	Butter	do	1,499
Rice	tierces	89	Cheese	do	516
Indian corn	bushels	450			

TO HAYTI.

Beef	barrels	8	Bacon	pounds	1,636
Pork	do	25	Lard	do	11,573
Flour	do	1,193	Butter	do	1,903
Rice	tierces	3	Cheese	do	4,355
Tobacco	hogsheads	8			

Exports of domestic produce for 1848—Continued.

TO CUBA.

Beef	barrels	41	Rice	tierces	157
Pork	do	92	Bacon	pounds	15,455
Flour	do	963	Lard	do	24,667
Indian meal	do	25	Butter	do	6,194
Biscuit	do	146	Cheese	do	2,843

TO PORTO RICO.

Beef	barrels	23	Indian corn	bushels	139
Pork	do	1,225	Tobacco	hogsheads	12
Flour	do	6,980	Bacon	pounds	42,936
Indian meal	do	2,972	Lard	do	207,054
Biscuit	do	819	Butter	do	45,187
Biscuit	kegs	1,476	Cheese	do	39,750
Rice	tierces	418			

TO VENEZUELA.

Beef	barrels	77	Indian corn	bushels	1,608
Pork	do	50	Tobacco	hogsheads	40
Flour	do	10,412	Bacon	do	10,154
Indian meal	do	1,574	Lard	do	77,685
Biscuit	do	76	Butter	do	16,494
Biscuit	kegs	50	Cheese	do	9,413
Rice	tierces	171			

TO BRAZIL.

Beef	barrels	265	Indian corn	bushels	400
Pork	do	142	Tobacco	hogsheads	62
Flour	do	131,412	Bacon	pounds	104,665
Indian meal	do	200	Lard	do	191,794
Biscuit	do	84	Butter	do	5,930
Biscuit	kegs	279	Cheese	do	4,252

TO MONTEVIDEO.

Beef	barrels	20	Bacon	pounds	47,301
Pork	do	20	Lard	do	47,529
Flour	do	19,094	Butter	do	12,658
Biscuit	do	100	Cheese	do	608
Biscuit	kegs	230	Tobacco	hogsheads	35

TO PERU.

Beef	barrels	40	Bacon	pounds	6,264
Pork	do	50	Lard	do	3,432
Flour	do	200	Tobacco	hogsheads	18
Biscuit	kegs	115			

TO CHILI.

Beef	barrels	128	Bacon	pounds	41,587
Pork	do	480	Lard	do	30,102
Flour	do	356	Butter	do	4,538
Biscuit	do	61	Cheese	do	668
Biscuit	kegs	325			

TO AFRICA.

Beef	barrels	313	Biscuit	barrels	60
Pork	do	163	Tobacco	hogsheads	132
Flour	do	431	Bacon	pounds	45,027
Indian meal	do	16	Butter	do	4,740

Exports of domestic produce for 1848—Continued.

TO HONDURAS.

Beef	barrels	15	Tobacco	hogsheads	10
Pork	do	10	Bacon	pounds	360
Flour	do	105	Butter	do	748
Wheat	bushels	1,107	Cheese	do	1,400
Rice	tierces	10			

TO NEW GRENADA.

Pork	barrels	8	Tobacco	hogsheads	4
Flour	do	15	Bacon	pounds	202
Biscuit	do	10	Lard	do	183
Biscuit	kegs	50			

TO MADEIRA.

Flour	barrels	532	Indian corn	bushels	12,711

Importations in 1848.

COFFEE.

Bags	237,000

COTTON.

Bales	24,345

HIDES.

Number	186,416

MOLASSES.

Hogsheads	8,460
Barrels	16,827

RICE.

Barrels	164
Casks	915
Tierces	1,692

SUGAR.

Hogsheads	24,657
Barrels	7,937
Boxes	5,913
Tierces	1,277
Bags	4,100
Ceroons	415

Specific importations this year and to same period last year.

	This year.	Last year.
Coffee, bags	230,381	128,291
Sugar, hogsheads	15,447	18,123
tierces	432	142
barrels	2,554	3,394
bags	5,820	7,656
boxes	5,905	8,662
Molasses, hogsheads	6,538	8,035
tierces	859	167
barrels	242	167
Hides, (ox and cow,) number	174,279	208,387
green salted		

Flour and meal inspections this year and to same period last year.

Flour, Howard street, barrels	467,135	612,205
half barrels	3,973	2,945
city mills, barrels	227,115	225,479
half barrels	19,940	22,237
family, barrels	22,347	21,932
half barrels	564	246
Susquehanna, barrels	9,404	42,051
Rye flour, barrels	7,535	6,361
Corn meal, hogsheads	333	1,779
barrels	57,358	101,380
Total	475,161	540,419

Rye flour. Barrels.	Meal. Hogsheads.	Meal. Barrels.
2,690	20	18,820
1,604	105	6,468
1,206	...	11,930
5,500	308	37,218
1,902	25	22,254
7,402	333	59,472

Tobacco inspection this year and to same period last year.

Maryland	hogsheads	23,054	34,753
Ohio	do	10,009	15,173
Virginia	do	60	69
Kentucky	do	548	608
Missouri	do	32	54
Stems	do	6	...
Total hogsheads		33,709	50,607
Tobacco exported, hogsheads		32,499	52,009
Stems or scraps exported		1,334	2,100
Stock tobacco on hand			31,470

WHISKEY.

Hogsheads	848
Barrels	20,621

Of which 225 hogsheads and 4,430 barrels were received by the Tide Water Canal.

LEATHER.

Sides	314,407

Arrivals, &c., in 1848 of foreign vessels.

	Ships.	Barques.	Brigs.	Schs.
Total	23	7	50	32
Add American	36	69	139	115
Add coastwise	42	166	233	974
Total arrivals	101	242	422	1121

Clearances in 1848.

	Ships.	Barques.	Brigs.	Schs.
Foreign	30	12	51	36
American	53	80	168	137
Total clearances	83	92	219	173

Ship building in 1848, &c.

Ships	8		
Barques	6		
Brigs	11		
Schooners	40		
Sloop	1		
Steamers	3		
			Tons.
Total 1848	69		14,447.44
1847	80		12,868.06
1846	74		11,198.54

[*Lyford's Journal.*

LOUISIANA.

The present and next sugar crops.—Mr. Solon Robinson, a celebrated writer on agricultural subjects, in a communication to the New Orleans Picayune, gives some interesting facts in relation to the present and next sugar crops; a synopsis of which will be found interesting to many of our readers:

Mr. Robinson visited most of the plantations on both sides of the river below Baton Rouge, and on the Lafourche, and his observations satisfied him that the crop of 1848 is not an average one by full one-fourth. The quality is above an average. The yield of molasses is generally large, and of a good quality. One crop of 595 hogsheads sugar, gave 51 200 gallons of molasses. Another of 300 hogsheads gave 31,200 gallons. The average is above 60 gallons to the hogshead.

There is much complaint of fermentation in the cisterns, and some planters are boiling it over.

While some old places, however, have made short crops, it is worthy of note that there has probably been somewhere near one hundred new places added to the list within the year, some of which astonished their owners. If the present crop, however, on the whole, is short, should the price advance?

In relation to the rot in seed cane, Mr. R. says:

"In the last three or four weeks that I have spent among planters on the west coast, and on Bayou Lafourche and on Terrebonne, I have had an opportunity to learn a great deal of the extent of the disease in the seed cane. It is true that the seed is affected to an alarming extent. It is different from the rot of former years. This commences in a small reddish thread in the centre of the cane, at the butt, and spreads up until the whole inside is reddened and dead, while the eyes still look as though they would grow. Much of the seed that has been planted had the incipient stages of the disease, and it is supposed by many that it will continue to increase, and the eyes will never sprout. From my observation I am satisfied that the planting is shortened one-fourth, and if the affected canes fail to grow, to the degree anticipated by many intelligent gentlemen, the crop will be shortened much more."

Some supposed that the rot was caused by the seed running out, but late importations were affected in the same way. Others are

satisfied that the disease arises from the fact that the seed was put up in very dry weather, but it was equally affected where put up in very wet weather. How far this is going to affect the next crop, is worthy of reflection at the present time.

The high water has also injured crops in two ways, i. e.—"by drawing off an immense amount of labor from the field at the very moment that it is very important that all the force should be engaged in planting, and then the transpiration water in its present cold state must produce a deleterious effect, to say nothing of overflow from crevasses."

Mr. Niles, of the firm of Niles & Co., of Cincinnati, informed Mr. R. that they put up, last year, sixty-eight new mills, and two-thirds of them were upon new places. Other establishments in Cincinnati furnished twenty new mills, and he supposed that Pittsburgh, New York, and New Orleans furnished at least thirty-two more, making one hundred and twenty, which would give eighty as the number of new places. Mr. Niles says there will be one hundred new mills put up this year, and one hundred and fifty next. He has already seventy applications for 1850, mostly from Red river, the Felicianas, and upper Bayou Bœuf. Mr. Niles also estimates the yield of molasses at 60 gallons to the hogshead, thus confirming the statement of Mr. Robinson.

Imports into New Orleans from the interior.

		1848.	1847.
Bacon, assorted	hogsheads and casks..	13,827	8,228
Do......do	barrels and boxes..	16,860	6,889
Bacon, hams	hogsheads and tierces..	7,388	5,444
Bacon, in bulk	pounds..	130,000	27,540
Bagging	pieces..	28,325	48,187
Bale rope	coils..	35,105	36,044
Beans	barrels..	7,927	14,857
Butter	kegs and firkins..	33,105	24,306
Do	barrels..	1,443	923
Beeswax		186	......
Do	pounds..	......	3,550
Beef	barrels..	30,053	28,148
Do	hogsheads and tierces..	34,027	10,304
Beef, dried	pounds..	20,300	50,600
Buffalo robes	packs..	9	6
Cotton. Natchez and Mississippi	bales..	558,468	593,694
Cotton. Lake		9,678	8,077
Cotton. Northern Alabama and Tennessee		100,652	87,102
Cotton. Arkansas		22,796	36,410
Cotton. Mobile		19,172	3,785
Cotton. Florida		2,388	1,601
Cotton. Texas		1,900	3,910
Corn meal	barrels..	8,968	20,844
Corn, in ear		213,046	258,696
Corn, shelled	sacks..	990,821	491,748
Cheese	boxes..	37,337	34,575
Coal, western	barrels..	46,000	181,500
Dried apples		1,747	986
Dried peaches		459	275
Feathers	bags..	2,558	1,607
Flax seed	tierces..	580	2,613
Flour	barrels..	669,472	372,052
Furs	[illegible] hogsheads..	[illegible]	62

Imports into New Orleans from the interior—Continued.

		1848.	1847.
Furs	bundles..	59	100
Hemp	bales..	10,264	8,869
Hides	No..	13,003	24,702
Horns		......	11,000
Hay	barrels..	30,362	33,108
Iron, pig	tons..	413	239
Lard	hogsheads..	382	209
Do	tierces and barrels..	117,615	128,017
Do	kegs..	177,560	213,133
Lime, western	hogsheads and barrels..	2,692	5,703
Lead	pigs..	189,136	217,725
Lead, bar	kegs and boxes..	437	524
Lead, white	kegs..	4,051	6.067
Molasses	barrels..	93,216	118,000
Oats	barrels and sacks..	130,811	214,739
Oil, linseed	barrels..	984	1,084
Oil, castor		1,295	702
Oil, lard		4,042	1,872
Oil, cake		2,467	4
Potatoes		96,861	105,112
Pork	barrels and tierces..	369,539	181,759
Do	boxes..	12,959	......
Do	hogsheads..	14,025	10,815
Pork, in bulk	pounds..	2,989,180	5,343,930
Skins, deer	packages..	478	462
Skins, bear		7	12
Shot	kegs..	2,355	4,353
Soap	boxes..	4,047	2,715
Staves	M..	527	17
Sugar	hogsheads..	69,665	81,607
Do	barrels..	1,928	......
Spanish moss	bales..	1,222	2,072
Tallow	barrels..	9,975	3,702
Tobacco, leaf	hogsheads..	7,443	15,393
Do chewing	kegs and boxes..	1,749	5,057
Do	bales..	19	68
Wool	bags..	426	963
Whiskey	barrels..	66,353	66,224
Wheat	barrels and sacks..	151,080	26,109

Cotton and tobacco statement.

			Cotton. bales.	Tobacco. hhds.
Stock, September 1, 1848			37,401	14,851
Received in September			57,766	1,664
Do October			108,220	662
Do November			115,607	839
Do December			153,031	1,526
January 1 and 2, 1849			7,660	8
January 3			3,523	209
			483,213	19,759
Exported from January 1 to January 3	3,621	4		
Previously	297,441	9,356		
			301,065	9,360
On hand, not cleared			182,146	10,399

Comparative prices of sugar and molasses on the Levee, on the first of each month, for five years.

	SUGAR.					MOLASSES.				
	1847–'48.	1846–'47.	1845–'46.	1844–'45.	1843–'44.	1847–'48.	1846–'47.	1845–'46.	1841–'45.	1843–'44.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
September	5 *a* 7¾	4½ *a* 7¼	6 *a* 6¼	5 *a* 6¾	5½ *a* 6¾	28 *a* 32	15 *a* 22	24 *a* 27	26 *a* 28	18 *a* 21
October	5 *a* 7½	6¼ *a* 9	6 *a* 7½	5 *a* 6¾	6 *a* 7	28 *a* 32	20 *a* 25	21 *a* 24	24 *a* 26	23 *a* 24
November	3 *a* 5½	5½ *a* 7	5 *a* 7	4 *a* 5¾	5 *a* 6½	22½ *a* 23	26 *a* 26½	21 *a* 22	20 *a* 21	14 *a* 20½
December	2½ *a* 5	4½ *a* 7	4 *a* 6½	3 *a* 5¾	4½ *a* 6¼	19¼ *a* 19½	23 *a* 23½	20 *a* —	20½ *a* 20¾	20 *a* 21
January	2 *a* 5	5 *a* 7⅛	4¼ *a* 6½	2¾ *a* 5¼	4¾ *a* 7½	17 *a* 17¼	21½ *a* 25	21 *a* 21½	16½ *a* 17½	22½ *a* 23
February	2½ *a* 5¼	5 *a* 7⅛	4 *a* 6⅛	2¾ *a* 5¼	5 *a* 7¼	17 *a* 19	27 *a* —	21 *a* 21½	14½ *a* 16	22 *a* 23
March	2¼ *a* 5	5¼ *a* 7½	4 *a* 6¼	3 *a* 5½	5 *a* 7¼	15 *a* 21	29 *a* 29¼	22½ *a* 23	20½ *a* 21	23 *a* 24
April	2¼ *a* 5	5¾ *a* 7½	4 *a* 6¼	5 *a* 6¾	5½ *a* 7¼	15 *a* 21	25 *a* 29	25 *a* 25½	25 *a* 26	23 *a* 25
May	1¾ *a* 4¾	5 *a* 7½	4⅛ *a* 6¼	5 *a* 6¾	5½ *a* 7¼	12 *a* 16	26 *a* 30	23 *a* 23½	24 *a* 27	25 *a* 26½
June	1½ *a* 4½	5 *a* 7½	4 *a* 6¼	4½ *a* 6½	4¾ *a* 6⅞	15 *a* 20	26 *a* 30	18 *a* 22	13 *a* 27	24 *a* 25
July	2½ *a* 4¾	5 *a* 7¾	4 *a* 6⅝	4½ *a* 6½	4¾ *a* 6¾	15 *a* 20	26 *a* 30	15 *a* 20	20 *a* 27	24 *a* 26
August	2¾ *a* 4¼	5¼ *a* 8	4½ *a* 7¼	5½ *a* 7	4½ *a* 6¾	15 *a* 20	28 *a* 31	15 *a* 21	26 *a* 28	25¼ *a* 26¼

Comparative prices of flour, mess and prime pork, and corn, in sacks, on the first of each month, for five years.

	FLOUR.					PORK.				CORN IN, SACKS.				
						1847–'8.		1846–'7.						
	1847–'8.	1846–'7.	1845–'6.	1844–'5.	1843–'4.	Mess.	Prime.	Mess.	Prime.	1847–'8.	1846–'7.	1845–'6.	1844–'5.	1843–'4.
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Cents.*	*Cents*	*Cents.*	*Cents.*	*Cents.*
September ..	4¾ *a* 6	3½ *a* 4	3½ *a* 4½	– *a* 6	4⅛ *a* 4¾	15 *a* —	12½ *a* 12¾	8¾ *a* 8⅞	6½ *a* 6¾	50 *a* 55	36 *a* 40	40 *a* 42	43 *a* 44	42 *a* 43
October	4 *a* 5	4 *a* 4⅝	3⅝ *a* 4¼	3⅞ *a* 4⅜	4 *a* 4⅜	13½ *a* 13¾	12¼ *a* 12½	8⅝ *a* 8¾	7 *a* 7⅛	50 *a* 75	60 *a* 65	35 *a* 38	40 *a* —	37 *a* 40
November ..	5¼ *a* 5⅜	5 *a* 5½	4½ *a* 5¼	4 *a* 4¼	4 *a* 4¼	12⅛ *a* 12½	11¼ *a* —	9⅜ *a* 9⅝	8 *a* 8¼	41 *a* 50	58 *a* 75	45 *a* 50	43 *a* 45	34 *a* 35
December...	5⅛ *a* 6	4⅞ *a* 5⅜	7½ *a* 8½	4 *a* 4⅜	4¼ *a* 4½	10⅝ *a* 11	8⅝ *a* 9	8¾ *a* 9	7½ *a* —	45 *a* 50	60 *a* 70	80 *a* 82	34 *a* 37	43 *a* 45
January ...	5½ *a* 6	4⅜ *a* 5¼	5¾ *a* 7	4⅝ *a* 5¼	4⅜ *a* 4½	9 *a* 9½	7 *a* 7¼	9⅛ *a* 9½	8¼ *a* 8¾	54 *a* 60	55 *a* 67	55 *a* 63	37 *a* 38	36 *a* 38
February ...	4¾ *a* 5¼	6 *a* 6½	5 *a* 6¼	3¾ *a* 4½	4⅛ *a* —	9½ *a* 9¾	7 *a* 7¾	14 *a* 14½	12 *a* 13	40 *a* 55	80 *a* 90	40 *a* 50	38 *a* 40	32 *a* 33
March	5 *a* 5¾	5½ *a* 6¼	4⅝ *a* 5¼	4 *a* 4¾	4¼ *a* 4⅝	9 *a* 9¼	7 *a* 7¼	15 *a* 15¼	12½ *a* 12¾	36 *a* 42	75 *a* 90	47 *a* 52	40 *a* 41	35 *a* 35
April.......	5¼ *a* 5⅞	6 *a* 6¼	4⅛ *a* 5	3⅞ *a* 4⅝	4¼ *a* 4½	8¾ *a* 9	6¾ *a* 7	15 *a* 15½	12½ *a* 12¾	30 *a* 38	80 *a* 95	42 *a* 50	35 *a* 36	40 *a* 42
May........	4¼ *a* 5¼	5¾ *a* 6½	4 *a* 4¾	3⅞ *a* 4½	4⅛ *a* 4¼	8⅛ *a* 8⅜	6¾ *a* 7	16 *a* 16¼	12½ *a* 12¾	22 *a* 28	55 *a* 70	40 *a* 50	35 *a* 38	40 *a* 41
June	4¼ *a* 4¾	6¾ *a* 7½	3⅜ *a* 4½	3¾ *a* 4⅜	3½ *a* 3¾	9½ *a* —	7⅜ *a* 7½	15⅝ *a* 16¾	12½ *a* 12¾	32 *a* 36	65 *a* 80	35 *a* 40	28 *a* 32	33 *a* 35
July........	4¼ *a* 5	6 *a* 7	3 *a* 4	3¼ *a* 4⅜	3½ *a* 4½	10 *a* —	7⅝ *a* 7¾	16¼ *a* 16½	13¼ *a* 13½	33 *a* 39	65 *a* 75	25 *a* 32	30 *a* 34	40 *a* 43
August	4¼ *a* 4⅝	4 *a* 5½	3¼ *a* 4	4 *a* 4¾	4 *a* 5¼	10 *a* 10¼	7½ *a* 8	16 *a* —	13 *a* —	36 *a* 42	40 *a* 50	30 *a* 35	34 *a* 36	40 *a* 45

Comparative rates of freight on cotton and tobacco to Liverpool, Havre, and New York, on the first of each month, for the past two years.

Months.	COTTON.—PER POUND.						TOBACCO.—PER HOGSHEAD.					
	1847–'48.			1846–'47.			1847–'48.			1846–'47.		
	Liverpool.	Havre.	New York.	Liverpool.	Havre.	New York.	Liverpool.	Havre.	New York.	Liverpool.	Havre.	New York.
	d.	*Ct.*	*Ct*	*d.*	*Ct.*	*Ct.*	*s d.*			*s d.*		
September...	½	–	½	½	1 1-16	½	40 0	......	$5 50	40 0	......	$3 87½
October.....	⅝	1¼	½	½	1 1-16	½	40 0	......	4 75	40 0	......	3 87½
November....	⅝	1¼	⅝	⅜	⅞	⅜	40 0	......	6 00	37 6	......	3 87½
December....	½	1	½	½	1	½	40 0	$9 50	4 75	......	.....	3 25
January	7-16	1	⅜	⅝	1⅛	½	40 0	9 50	4 00	57 0	......	7 50
February....	½	1	½	9-16	1¼	¾	39 0	9 50	4 75	57 0	......	6 75
March	15-32	15-16	½	1	2	1¼	40 0	......	5 25	......	......	11 00
April........	9-16	1	½	⅝	1¾	¾	40 0	......	5 25	.....	......	8 00
May.........	9-16	–	⅝	⅝	1¼	¾	45 0	......	7 50	......	......	11 00
June	7-16	–	⅜	9-16	1	¾	36 0	......	4 75	......	......	7 75
July	⅜	–	⅜	⅝	1¼	¾	35 0	9 00	4 00	......	$13 00	8 50
August	5-16	–	¼	⅝	1¼	⅝	30 0	7 00	2 00	50 0	13 00	8 00

Exports, the growth, produce, and manufacture of the United States.

THIRD QUARTER, 1847.

In American vessels to foreign countries	$3,297,322	
In foreign......do......do......do......................	911,323	
Coastwise	3,745,771	
		$12,954,416

FOURTH QUARTER, 1847.

In American vessels to foreign countries	$5,731,775	
In foreign......do......do......do......................	1,163,105	
Coastwise	5,627,935	
		12,522,815

FIRST QUARTER, 1848.

In American vessels to foreign countries	$7,372,330	
In foreign......do......do......do......................	5,358,774	
Coastwise	11,317,460	
		24,048,564

SECOND QUARTER, 1848.

In American vessels to foreign countries	$6,240,142	
In foreign......do......do......do......................	4,273,951	
Coastwise..	7,142,435	
		17,656,528

Total for the year ending June 30, 1848..................................	67,182,323

MOBILE, ALABAMA.

Monthly range of prices of cotton in this city for three years.

	1845–'46.	1846–'47.	1847–'48.
October	$6\frac{1}{2}$ a $8\frac{7}{8}$	8 a $10\frac{1}{4}$	$8\frac{1}{2}$ a $10\frac{1}{4}$
November	$6\frac{5}{8}$ a $8\frac{3}{4}$	9 a $10\frac{1}{2}$	$6\frac{3}{8}$ a $7\frac{3}{4}$
December	$6\frac{3}{8}$ a $8\frac{3}{4}$	$8\frac{1}{2}$ a 10	$6\frac{1}{8}$ a $7\frac{1}{2}$
January	6 a $8\frac{1}{2}$	$9\frac{1}{2}$ a $11\frac{1}{2}$	6 a $7\frac{1}{2}$
February	6 a $8\frac{1}{2}$	9 a 12	$6\frac{1}{4}$ a $7\frac{1}{2}$
March	$6\frac{1}{4}$ a 9	9 a $11\frac{1}{2}$	6 a $7\frac{3}{8}$
April	$6\frac{1}{4}$ a $8\frac{7}{8}$	$9\frac{3}{4}$ a $11\frac{1}{2}$	5 a $6\frac{5}{8}$
May	$5\frac{7}{8}$ a $7\frac{3}{4}$	$9\frac{3}{4}$ a 12	$4\frac{1}{4}$ a $6\frac{1}{4}$
June	6 a $7\frac{3}{4}$	9 a $11\frac{1}{8}$	$4\frac{3}{4}$ a $6\frac{1}{2}$
Average for the season	$6\frac{1}{4}$ a $8\frac{1}{2}$	9 a $11\frac{1}{8}$	$5\frac{3}{4}$ a $7\frac{1}{4}$

NOTE.—The range of prices embraces the grades betweeen "inferior and good fair," excepting 1841–'42 and 1842–'43, and a month or two at the commencement and close of the season, when the extreme qualities are usually scarce, especially the upper grades. In 1844 '45, no inferior or good fair quoted in October, November, or December. In January, February, and March, the quotations embrace those grades and that of inferior in the next two months. For the season just ended, the range throughout the year embraces only the grades ranging from ordinary to fair, both inclusive.

NEW YORK.

TRADE AND COMMERCE OF THE CANALS.

[From the Albany Evening Journal.]

Knowing that our commercial readers, both in this city and elsewhere, were anxious to see, as early as possible, a statement of the amount of produce, &c., left at tide water, we published a report, some days since, made up, in part, from the weekly returns. The subjoined tables, however, are more full and accurate. They are made up from the official reports from the collectors' offices at Albany, West Troy, and Waterford, to the canal department.

In comparing the aggregate of the different articles with the statement previously made, we do not find any material difference. Before the reports from the various offices are made, the entire year is reviewed, and the errors that have occurred in the weekly returns are then corrected. The subjoined table, therefore, may be considered substantially official.

We do not consider it necessary to point out the increase or diminution of the articles enumerated in these tables, because they are so arranged that the reader, at a single glance, can see the changes that have occurred during the past three years.

Statement, showing the total quantity of each article which came to the Hudson River, on all the canals, during the years 1846, 1847, 1848.

THE FOREST.

	1846.	1847.	1848.
Fur and peltry ......pounds...	817,156	556,000	557,271
Product of wood.			
Boards and scantling ......feet....	260,335,270	299,078,633	362,279,116
Shingles ......M.....	69,822	101,527	104,270
Timber......cubic feet.	1,798,198	1,613,953	5,098,777
Staves	106,152,500	95,104,000	113,656,951
Wood......cords...	11,832	13,331	13,601
Ashes......barrels..	46,812	37,538	38,229

AGRICULTURE.

Product of animals.

		1846.	1847.	1848.
Pork	barrels..	80,093	76,179	87,930
Beef	do....	34,600	71,266	60,570
Bacon	pounds..	4,000,500	4,902,000	8,183,285
Cheese	do....	35,560,118	40,844,000	43,278,526
Butter	do....	21,477,657	22,724,000	23,729,997
Lard	do....	6,721,000	4,348,000	9,925,663
Wool	do....	8,866,376	12,044,000	8,529,331
Hides	do....	340,900	172,000	174,935

Vegetable food.

		1846.	1847.	1848.
Flour	barrels..	3,053,441	3,952,972	3,131,095
Wheat	bushels..	2,950,636	4,843,830	3,116,134
Rye	do....	321,799	295,119	286,919
Corn	do....	1,610,149	6,053,845	2,953,963
Barley	do....	1,427,953	1,523,020	1,548,157
Other grain	do....	1,920,800	2,040,052	2,077,724
Ship stuffs	do....	1,468,272	2,093,681	1,437,487
Peas and beans	do....	96,890	106,088	75,808
Potatoes	do....	230,939	108,369	115,629
Dried fruits	do....	1,502,900	3,558,000	1,828,145

All other agricultural products.

		1846.	1847.	1848.
Cotton	pounds..	445,100	474,000	174,700
Tobacco	do....	2,609,100	1,228,000	350,935
Grass seed	do....	1,094,400	3,308,000	1,667,030
Flax seed	do....	5,283,700	4,128,000	1,763,393
Hops	do....	1,690,500	1,948,000	1,597,342

MANUFACTURES.

		1846.	1847.	1848.
Domestic spirits	gallons..	1,426,459	1,693,076	1,606,131
Leather	pounds..	5,160,654	2,168,000	4,458,951
Furniture	do....	2,226,114	1,971,000	1,535,365
Bar and pig lead	do....	489,800	482,000	86,100
Bloom and bar iron	do....	10,882,243	26,348,000	29,777,506
Pig iron	do....	10,574,740	21,608,000	11,528,683
Iron ware	do....	1,219,091	3,014,064	2,314,064
Domestic woolens	do....	1,425,340	1,756,000	1,103,564
Domestic cottons	do....	2,324,774	2,396,090	2,493,561
Salt	bushels..	692,442	382,370	343,618

OTHER ARTICLES.

		1846.	1847.	1848.
Stone lime, &c	pounds..	41,200,033	59,094,000	65,246,668
Gypsum	do....	12,084,100	8,518,000	3,715,980
Mineral coal	do....	18,846,600	32,580,000	48,291,417
Sundries	do....	90,841,614	147,988,000	97,796,493

Statement showing the aggregate in tons under the divisions specified in the above table.

	1846.	1847.	1848.
The forest	603,010	666,113	615,325
Agriculture	628,454	897,717	685,896
Manufactures	46,076	51,532	37,430
Merchandise	1,797	4,831	6,343
Other articles	82,982	124,090	107,527
Total	1,362,319	1,744,283	1,472,521

Statement showing the estimated value of each article which came to the Hudson River, on all the canals, during the years 1846, 1847, *and* 1848.

	1846.	1847.	1848.
THE FOREST.			
Fur and peltry	$1,021,385	$690,150	$695,838
Product of wood.			
Boards and scantling	4,422,936	5,073,564	3,031,277
Shingles	344,378	405,548	338,861
Timber	251,096	169,160	300,798
Staves	1,513,432	1,239,677	511,463
Wood	59,160	79,986	69,462
Ashes	1,076,904	1,135,288	1,146,870
AGRICULTURE.			
Product of animals.			
Pork	800,927	1,101,673	967,230
Beef	354,800	718,344	605,700
Bacon	290,067	416,738	490,927
Cheese	2,844,587	2,860,354	3,029,169
Butter	3,220,633	3,403,751	3,359,391
Lard	498,820	434,780	761,767
Wool	2,571,415	3,599,963	2,304,046
Hides	42,613	21,611	17,494
Vegetable food.			
Flour	15,480,271	27,057,037	17,471,401
Wheat	3,366,141	5,833,901	3,677,020
Rye	232,304	259,950	209,310
Corn	1,126,854	5,170,970	1,834,388
Barley	813,933	1,279,357	1,037,293
Other grain	710,474	977,967	747,930
Ship stuffs	220,181	293,117	472,578
Peas and beans	96,800	106,108	75,808
Potatoes	114,686	51,755	53,100
Dried fruit	135,261	320,364	161,533
All other agricultural products.			
Cotton	34,495	35,498	11,356
Tobacco	313,092	150,735	43,127
Grass seed	76,608	231,518	116,692
Flax seed	131,943	103,219	35,268
Hops	185,955	158,179	159,695
MANUFACTURES.			
Domestic spirits	313,840	473,651	385,471
Leather	928,918	965,204	608,842
Furniture	273,611	197,251	153,536
Bar and pig lead	19,592	19,281	3,875
Bloom and bar iron	265,222	660,896	744,687
Pig iron	182,574	340,498	172,931
Iron ware	48,830	128,807	80,993
Domestic woolens	1,923,390	2,369,181	832,851
Domestic cottons	719,787	740,909	622,652
Salt	180,035	133,830	106,522
OTHER ARTICLES.			
Stone, lime, and clay	63,179	63,129	92,370
Gypsum	26,933	17,[illegible]	8,336
Mineral coal	47,1[illegible]6	81,453	108,656
Sundries	2,6[illegible],257	2,844,914	2,001,252

Statement showing the aggregate value of the property which came to the Hudson river, on all the canals, during the years 1846, 1847, and 1848, under the divisions as specified in the above table.

	1846.	1847.	1848.
The forest	$3,589,291	$8,793,373	$6,994,469
Agriculture	33,682,818	54,624,349	37,336,390
Manufactures	4,885,799	6,024,518	3,834,360
Merchandise	276,872	517,594	593,649
Other articles	3,770,476	3,127,680	2,210,[illegible]
Total	51,105,256	73,092,414	50,969,[illegible]

The following table shows the gross amount of tolls collected on each canal during the years 1847 and 1848:

Canals.	1847.	1848.
Erie	$3,334,347 36	$2,947,881 76
Champlain	120,097 80	117,500 66
Oswego	779,933 34	79,783 93
Cayuga and Seneca	28,925 95	28,814 20
Chemung	16,677 70	16,191 25
Crooked Lake	1,946 50	1,831 70
Chenango	28,570 33	32,257 05
Genesee Valley	26,707 25	26,722 12
Oneida Lake	624 74	688 97
Oneida River Improvement	176 07	235 08
Seneca River Tow Path	732 96	469 74
Total	3,635,380 00	3,252,367 34

CANAL BUSINESS OF OSWEGO FOR 1848.

The following tables, showing the exports and imports at Oswego, by canal, for 1848, have been furnished the *Times* of that place by M. Harmon, esq., the canal collector

Statement of property left at Oswego, on the Oswego canal, or which was left between that place and the collector's office, next in order on the canal, showing the quantity and average value of each article during the year 1848.

Articles.		Quantity.	Tons.	Value.
Furs and peltry	pounds	1,316	1	$3,948
Boards and scantling	feet	1,010,604	1,684	7,074
Shingles	M	304	30	608
Timber	cubic feet	13,183	264	527
Staves	pounds	953,616	477	3,814
Wood	cords	266	745	532
Ashes	barrels	10	3	280
Pork	do	157	25	1,590
Bacon	pounds	11,189	6	504
Cheese	do	1,382	1	79
Butter	do	2,500	1	325
Lard	do	1,351	1	95
Wool	do	11,935	6	2,6[illegible]
Hides	do	431,525	241	43,[illegible]
Flour	barrels	860	93	4,386
Wheat	bushels	319,671	9,500	326,064
Corn	do	2		1
Other grain	do	3,435	55	1,031
Bran and ship stuffs	do	8,607	99	1,076
Peas and beans	do	3		2
Potatoes	do	63	2	[illegible]
Cotton	pounds	264,529	132	[illegible]

Canal business of Oswego for 1848—Continued.

Articles.	Quantity.	Tons.	Value.
Tobacco....pounds......	45,496	23	1,305
Clover and grass seed....do........	16,422	8	575
Hops....do........	12,195	6	1,096
Domestic spirits....gallons......	7,962	32	1,752
Leather....pounds......	481,802	241	96,360
Furniture....do........	353,575	177	28,286
Bar and pig lead....do........	136,343	68	6,135
Pig iron....do........	683,303	342	10,250
Bloom and bar iron....do........	49,125	25	1.351
Iron ware....do........	2,509,751	1,255	94,116
Domestic woollens....do........	16,902	8	15,212
Domestic cottons....do........	11,610	6	2,670
Salt....bushels......	2,151,265	64,538	473,278
Merchandise....pounds......	26,058,780	13,029	7,817,634
Sugar....do........	9,603,990	4,802	504,209
Molasses....do........	3,258,436	1,628	97,693
Coffee....do........	2,385,230	1,193	190,818
Nails and spikes....do........	3,059,013	1,530	160,598
Iron and steel....do........	16,880,627	8,440	759,628
Crockery....do........	1,879,720	940	150,378
Oysters and clams....do........	72,037	36	1,441
Stone, lime, and clay....do........	7,344,601	3,672	22,034
Gypsum....do........	5,959,391	2,980	11,919
Mineral coal....do........	4,686,842	2,343	12,889
Sundries....do........	1,822,072	911	72,883
Other articles....do........		9,906	119,725
Total....		121,689	10,951,014

Statement of property first cleared at the collector's office at Oswego, on the Oswego canal, during the year 1848, *showing the quantity and average value of each article.*

Articles.	Quantity.	Tons.	Value.
Furs and peltry....pounds......	55,482	28	$110,964
Boards and scantling....feet.......	31,189,302	31,982	343,082
Shingles....M........	16,416	1,646	32,832
Timber....cubic feet.....	120,330	2,406	9,626
Staves....	3,215,084	1,608	16,075
Wood....cords........	342	958	684
Ashes....barrels......	7,938	1,985	222,264
Pork....do........	24,172	3,868	241,720
Beef....do........	1,480	222	11,400
Bacon....pounds......	2,414,663	1,207	108,660
Cheese....do........	5,396,545	2,698	310,301
Butter....do........	2,813,345	1,407	365,735
Lard....do........	4,260,994	2,130	298,270
Wool....do........	202,345	104	44,516
Hides....do........	65,220	33	3,261
Flour....barrels......	614,837	66,402	3,135,669
Wheat....bushels......	800,295	24,006	816,301
Rye....do........	53,507	1,498	26,254
Corn....do........	343,528	9,619	144,282
Barley....do........	235,856	5,660	108,494
Other grain....do........	60,502	968	18,154
Bran and ship stuffs....do........	994,410	8,944	124,301
Peas and beans....do........	28,564	857	18,567
Potatoes....do........	53	1	20
Dried fruit....pounds......	20	....	1
Tobacco....do........	40,664	20	1,220
Clover and grass seed....do........	327,215	164	11,452
Flax....do........	135,834	68	119,534
Hops....do........	180,645	90	16,258

Statement—Continued.

Articles.	Quantity.	Tons.	Value.
Domestic spirits..................gallons......	51,682	26	11,370
Leather ....pounds......	187,438	94	33,739
Furniture...............................do........	217,895	109	10,895
Pig iron..................................do........	914,190	457	13,713
Bloom and bar iron....................do........	5,788	3	159
Iron ware................................do........	55,812	23	2,093
Domestic woollens......................do........	70,557	35	63,501
Domestic cottons.......................do........	173,234	87	39,844
Salt.......................................bushels......	575,078	17,252	126,517
Merchandise ....pounds......	266,909	133	80,073
Sugar ....do........	35,103	18	1,843
Molasses..................................do........	360	....	10
Coffee.. ....do........	640	....	51
Nails and spikes.......................do........	6,327	3	332
Iron and steel...........................do........	86,457	43	3,891
Crockery ....do........	27,152	14	2,172
Stone, lime, &c.........................do........	2,564,579	1,282	12,823
Mineral coal ....do........	627,178	314	1,125
Sundries ....do........	3,788,695	1,894	161,548
Other articles...........................do....................		3,490	166,096
Total..		213,371	7,215,893

The foregoing exhibit, compared with the remarkable season of 1847, shows a considerable increase. The imports and exports of the two seasons reduced to tons, and the value, compare as follows:

	1847.	1848.
Canal imports ....tons.........	88,026	121,689
exports....................................do..........	205,000	213,371
Total tons..	293,026	335,060
		293,026
Increase of 1848 over 1847.................................... ...		42,034
Value of canal imports..	$7,887,432	$10,951,014
exports	7,781,757	7,215,893
Total value....................................	15,556,189	18,166,907
		15,556,189
Increase of 1848 over 1847..		2,610,740

The flour manufactured at Oswego Falls, and shipped east by canal, is cleared at the Salina office, and does not appear in the table of exports. The precise quantity made there last season amounted to 60,000 barrels, and these figures are added to the Oswego exports of the present year in making the following comparison of flour, wheat, and corn, exported from Oswego for three seasons:

	1846.	1847.	1848.
Flour...............................barrels......	477,318	667,295	674,837
Wheat...............................bushels......	433,446	726,554	800,295
Corn ....do........	347,747	933,043	343,528

The imports of salt show a steady and gratifying progress in the trade, and an increase in the imports this season over the last of 50,000 barrels. The imports of Onondaga salt for three seasons have been as follows:

	1846.	1847.	1847.
Salt imported.........................barrels......	305,896	380,761	430,253

The tolls collected at the office in Oswego, for five seasons, have been as follows, showing but a slight falling off the present year from the European famine season of 1847:

1844	$133,444
1845	138,704
1846	163,866
1847	233,224
1848	225,265
Excess of 1847 over 1848	7,959

LAKE BUSINESS OF OSWEGO.

The *Times* furnishes the following comparative table of the leading articles of importation in 1847 and 1848:

		1847.	1848.
Lumber	feet	33,715,234	34,329,320
Shingles	No	10,257,121	12,651,751
Staves	do	1,312,507	2,145,950
Wheat	bushels	3,286,537	3,642,683
Corn	do	914,440	373,185
Barley	do	112,004	131,560
Rye	do	41,325	51,765
Oats	do	37,530	63,136
Seed	do	10,252	15,812
Flour	barrels	153,236	89,702
Beef	do	7,681	3,751
Pork	do	13,831	29,973
Ashes	casks	6,571	6,517
Wool	pounds	298,756	198,642
Butter	do	2,485,456	2,712,641
Cheese	do	4,856,591	5,281,712
Lard	do	693,741	4,126,514
Hams	do	501,657	512,648

	1847.	1848.
Value of domestic imports	$7,798,808 69	$6,410,651 14
foreign imports	291,712 62	610,701 86
Total value of imports	8,090,576 33	7,021,353 00

Exports.

Merchandise exported West	pounds	38,662,823	$3,991,857
State	do	40,[illegible]60,751	3,975,161
Canada	do	15,255,100	2,187,606

Salt exported West	barrels	304,743
State	do	34,122
Canada	do	70,403
Total barrels		409,269
Total sacks		83,339
Value of salt exported		$411,917

		1847.	1848.
Salt exported	barrels	351,[illegible]40	409,269
Do	sacks	43,[illegible]92	83,339

Value of merchandise, etc., exported, coastwise and foreign	$10,154,624
do salt do do	411,917
Total value of foreign and domestic exports	10,566,551

By "etc." in the above is meant coal, water-lime, gypsum, and other articles of same nature, exclusive of salt.

CANAL EXPORTS AT BUFFALO FOR 1848.

Statement showing the total quantity of each article first cleared on the canal at, and the total tolls received from the canal at Buffalo during the year 1848.

DESCRIPTION OF ARTICLES.	QUANTITY.	
	FIRST CLEARED.	LEFT.
THE FOREST.		
Fur and peltry....pounds..	453,970	$567,463
Product of wood.		
Boards and scantling....feet..	28,747,535	344,970
Shingles....M..	2,706	5,412
Timber....cubic feet..	21,661	2,600
Staves....	87,477,638	262,433
Wood....cords..	53	106
Ashes....barrels..	13,960	342,250
Total of the forest....tons..	96,152	
Total value....dollars..	1,525,234	
Total tolls....do..	58,821	
AGRICULTURE.		
Product of animals.		
Pork....barrels..	67,076	536,608
Beef....do....	43,190	345,520
Bacon....pounds..	7,248,347	362,417
Cheese....	9,452,984	472,650
Butter....	7,036,601	774,026
Lard....	6,056,470	363,389
Wool....	5,883,856	1,470,964
Hides....	420,303	25,219
Product of animals....tons..	35,691	
Value....dollars..	4,350,793	
Tolls....do..	67,306	
Vegetable food.		
Flour....barrels..	1,241,870	5,737,439
Wheat....bushels..	3,973,440	3,814,502
Rye....	2,857	1,557
Corn....	2,187,562	918,776
Barley....	24,255	12,128
Other grain....	288,277	116,483
Bran and ship stuffs....	128	9
Peas and beans....	4,741	4,741
Potatoes....	7,533	3,767
Dried fruit....pounds..	205,214	16,117
Vegetable food....tons..	321,922	
Value....dollars..	10,626,119	
Tolls....do..	470,196	
All other agricultural products.		
Cotton....pounds..	....	....
Tobacco....	254,595	25,460
Clover and grass seed....	1,546,187	108,233
Flax seed....	2,758,107	55,102
Hops....	....	....
All other agricultural products....tons..	2,278	
Value....dollars..	188,795	
Tolls....do..	2,954	
Total agriculture....tons..	359,891	
Total value....dollars..	15,165,707	
Total tolls....do..	540,456	

STATEMENT—Continued.

DESCRIPTION OF ARTICLES.	QUANTITY.	
MANUFACTURES.	FIRST CLEARED.	LEFT.
Domestic spirits......gallons..	1,139,437	216,493
Leather......pounds..	486,096	87,497
Furniture......	1,210,890	121,089
Bar and pig lead......	94,171	3,767
Pig iron......	129,306	1,940
Bloom and bar iron......	81,228	3,655
Iron ware......	352,500	14,100
Domestic woolens......	26,613	27,613
Domestic cottons......	32,326	6,465
Salt......bushels..	....	....
Total manufactures......tons..	5,764	
Total value......dollars..	482,619	
Total tolls......do..	9,752	
Merchandise.		
At 8 mills......pounds..	186,563	55,969
At 5 mills, viz:		
Sugar......	20,263	2,026
Molasses......	1,130	31
Coffee......	....	....
Nails and spikes......	122,614	6,131
Iron and steel......	44,474	2,669
Crockery......	1,900	190
Oysters and clams......	....	52,711
Total merchandise......tons..	189	
Total value......dollars..	67,019	
Tolls......do..	262	
Other articles.		
Stone, lime, and clay......pounds..	2,594,346	2,594
Gypsum......	....	....
Mineral coal......	6,899,000	13,798
Sundries......	21,719,261	1,085,964
Other articles......tons..	15,607 00	
Tolls......dollars..	16,044 09	
Total tons......	477,603 00	
Total value......dollars..	18,342,935 00	
Total tolls......do..	672,618 09	

BUSINESS OF BUFFALO AND BLACK ROCK.

Statement showing the total quantity of each article first cleared on the canal at Buffalo and Black Rock, from the opening to the close of canal navigation, during the years 1846, 1847, *and* 1848.

THE FOREST.	1846.	1847.	1848.
Fur and peltry......pounds..	530,070	401,988	458,371
Product of wood.			
Shingles......M....	418	510	3,829
Timber......cubic feet..	213,858	314,429	521,783
Staves......	73,291,932	70,273,772	87,854,638
Wood......cords..	18,039	21,944	27,468
Ashes......barrels..	24,643	15,237	14,288

STATEMENT—Continued.

AGRICULTURE.

Product of animals.

	1846.	1847.	1848.
Pork......barrels..	61,514	56,383	67,412
Beef......	28,503	38,280	45,005
Bacon......pounds.	2,220,773	3,705,841	7,287,418
Cheese......	4,973,885	6,918,046	9,829,210
Butter......	4,662,192	6,842,511	7,416,223
Lard......	5,951,237	3,577,835	6,071,370
Wool......	4,117,886	5,926,116	5,999,830
Hides......	788,856	452,467	432,203

Vegetable food.

Flour......barrels..	1,437,994	2,068,686	1,395,664
Wheat......bushels.	3,637,366	5,836,730	4,065,641
Rye......	1,895	77,198	2,857
Corn......	1,121,089	2,996,842	2,218,219
Barley......	3,683	16,325	24,664
Other grain......	186,625	412,369	288,479
Bran and ship stuffs......	60,834	155,636	41,391
Peas and beans......	6,265	8,341	4,846
Potatoes......	774	208	7,608
Dried fruit......pounds.	290,492	1,104,318	217,800

All other agricultural products.

Cotton......pounds..	252,983	360,759	
Tobacco......	2,511,380	1,080,843	264,458
Clover and grass seed......	1,113,867	2,241,272	1,625,591
Flax seed......	971,796	2,541,200	2,760,793
Hops......	2,118	8,246	

MANUFACTURES.

Domestic spirits......gallons..	324,533	910,191	1,162,769
Leather......pounds..	1,142,256	819,922	493,705
Furniture......	1,356,630	1,289,826	1,315,908
Bar and pig lead......	517,290	352,622	96,211
Bloom and bar iron......	13,516	36,305	81,228
Pig iron......	22,078	72,407	129,366
Iron ware......	88,852	85,553	352,500
Domestic woolens......	7,545	23,570	27,613
Domestic cottons......	11,198	12,897	32,886

Other articles.

Stone, lime, and clay......pounds..	6,531,876	10,416,439	7,848,648
Gypsum......	6,410	......	5,000
Mineral coal......	3,286,162	1,566,133	6,899,000
Sundries......	11,195,191	14,517,094	22,500,367
Total tons......	478,917	710,943	602,250

The subjoined comparative table gives the quantity of each important article, *first cleared*, at *three* important *termini* of our State canals. We deem it unnecessary to go into any details in regard to the increase or the diminution of the shipments at these points, compared with previous years. The falling off in the shipments of vegetable products at those points can be seen at a glance, and the causes for the same are well known to all connected with the commerce of our canals or rivers. There has been some increase in the products of the forest and of animals, as will be seen by the subjoined.

Statement showing the aggregate quantity of each article first cleared on the canal at Buffalo, Black Rock, and Oswego, from the opening to the close of canal navigation, during the years 1846, 1847, and 1848.

THE FOREST.

	1846.	1847.	1848.
Fur and peltry ....pounds..	601,493	406,106	513,853
Product of wood.			
Boards and scantling..........feet..	49,853,613	69,673,336	67,671,096
Shingles..........M....	4,467,918	8,867,510	20,245
Timber..........cubic feet..	351,031	357,854	642,113
Staves	75,339,407	70,810,624	90,969,722
Wood..........cords..	18,197	22,140	27,750
Ashes..........barrels..	32,243	11,062	22,226
AGRICULTURE.			
Product of animals.			
Pork..........barrels..	71,516	64,751	91,584
Beef	37,187	41,725	46,485
Bacon ....pounds..	2,769,129	3,826,299	9,702,081
Cheese	9,841,911	11,804,317	15,225,755
Butter	7,326,745	9,350,716	10,229,568
Lard..........	6,504,300	4,279,400	10,332,464
Wool	4,363,688	6,221,913	6,202,175
Hides	880,201	523,874	497,423
Vegetable food.			
Flour..........barrels..	1,909,312	2,679,180	2,010,501
Wheat..........bushels..	4,070,812	6,550,261	4,865,936
Rye..........	50,293	105,354	56,364
Corn	1,463,836	3,930,272	2,561,747
Barley..........	98,556	110,158	260,520
Other grain..........	250,010	450,003	318,981
Bran and ship stuffs	821,413	1,385,827	1,035,801
Peas and beans..........	13,972	16,278	33,410
Potatoes	9,607	3,805	7,661
Dried fruit..........pounds.	292,208	1,132,162	217,820
All other agricultural products.			
Cotton ....pounds..	252,983	516,275	
Tobacco	2,669,536	1,196,071	305,122
Clover and grass seed	1,159,108	2,600,673	1,952,806
Flax seed	972,271	2,708,847	2,896,527
Hops	50,821	141,684	180,645
MANUFACTURES.			
Domestic spirits..........gallons..	358,216	952,351	1,211,451
Leather ....pounds..	1,642,961	1,123,265	681,143
Furniture	1,623,395	1,480,656	1,533,803
Bar and pig lead	692,224	371,592	96,211
Bloom and bar iron..........	325,916	81,160	87,916
Pig iron..........	182,114	508,368	1,044,096
Iron ware	109,478	111,158	408,312
Domestic woolens	139,218	132,075	98,170
Domestic cottons	136,594	130,818	206,120
Salt ....bushels..	....	334,836	575,078
Other articles.			
Stone, lime, and clay..........pounds..	7,881,004	14,759,945	10,413,227
Gypsum	140,310	....	5,000
Mineral coal..........	3,286,162	1,622,133	7,526,178
Sundries..........	13,693,803	19,199,233	26,289,002
Total tons	627,502	914,888	815,621

Property left at Buffalo going to Western States and Canada.

The following is a statement embracing the amount and value of all the property going to Western States and Canada, left at Buffalo, or between that place and the collector's office, next in order on the canal, during the season of 1848:

THE FOREST.

Description.	Quantity.	Value.
Fur and peltry........................pounds........	10,125	$12,656
Product of wood.		
Boards and scantling......................feet.........	550	55,543
Shingles, timber, staves, wood, and ashes—none.		
Total of the forest.............tons.........	6	$12,663

AGRICULTURE.

Description.	Quantity.	Value.
Product of animals.		
Pork—none.		
Beef ....barrels........	3	$24
Bacon—none.		
Cheese ....pounds........	1,770	89
Butter ....do..........	1,299	143
Lard—none.		
Wool...do..........	108	27
Hides ....do..........	116,879	15,194
Product of animals.............tons.........	60	$15,477
Vegetable food.		
Flour, wheat, rye, corn, barley, other grain, bran and ship stuffs, peas and beans, and potatoes—none		
Dried fruit.................................pounds........	22,005	$1,760
Vegetable food ....tons........	11	$1,760
All other agricultural products.		
Cotton—none.		
Tobacco....................................pounds........	781,081	$156,216
Clover and grass seed.....................do.........	1,110	73
Flaxseed—none.		
Hops ....do..........	89,814	13,472
All other agricultural products, tons.........	437	$160,766
Total agriculture.......tons.........	508	$187,003

MANUFACTURES.

Description.	Quantity.	Value.
Domestic spirits—none.		
Leather ....pounds........	579,278	$104,270
Furniture.....................................do..........	3,906,170	390,647
Bar and pig lead, pig iron, and bloom and bar iron—none.		
Iron ware ....pounds........	4,958,680	198,347
Domestic woolens ....do..........	1,600	1,600
Domestic cottons............................do..........	1,440	288
Salt...bushels........	2,540	635
Total manufactures............tons.........	4,795	$695,757

Property left at Buffalo—Continued.

MERCHANDISE.

Description.		Quantity.	Value.
At 8 mills	pounds	84,153,485	$25,249,046
At 5 mills, viz:			
Sugar	do	13,330,979	1,199,788
Molasses	do	6,797,156	203,915
Coffee	do	9,791,326	881,223
Nails and spikes	do	3,315,770	165,789
Iron and steel	do	6,516,432	300,986
Crockery	do	4,909,283	490,928
Oysters and clams	do	40,886	818
Total merchandise	tons	64,428	$28,579,493

Other articles.

Stone, lime, and clay	pounds	2,184,324	$2 184
Gypsum—none.			
Mineral coal	do	314,652	629
Sundries	do	1,101,012	55,051
Other articles	tons	1,800	$57,864
Total	tons	71,537	$29,532,780

Property cleared at Buffalo coming from western States and Canada.

The following is a statement embracing the amount and value of all the property coming from western States and Canada only, first cleared at Buffalo, during the season of 1848:

FOREST.

Description.		Quantity.	Value.
Fur and peltry	pounds	435,531	$544,414

Product of wood.

Boards and scantling	feet	21,501,864	259,222
Shingles	M	2,412	4,824
Timber	cubic feet	17,272	2,073
Staves	pounds	86,728,888	260,187
Wood	cords	6	12
Ashes	barrels	12.067	301,675
Total of the forest	tons	83,205	1,372 407
Total tolls			52,723

AGRICULTURE.

Product of animals.

Pork	barrels	63,634	509,072
Beef	do	41,664	333,312
Bacon	pounds	7,035,899	351,795
Cheese	do	6,070,611	303,531
Butter	do	5,304,756	583,523
Lard	do	5,893,293	353,598
Wool	do	5,168,597	1,292.147
Hides	do	341,610	20,497
Product of animals	tons	31,754	3,747,477
Total tolls			64,170

Property cleared at Buffalo—Continued.

Vegetable food.

		Quantity.	Value.
Flour	barrels	1,214,304	$5,610,084
Wheat	bushels	3,956,000	3,797,760
Rye	do	2,697	1,753
Corn	do	2,167,868	910,505
Barley	do	24,255	12,128
Other grain	do	361,824	109,447
Bran and shipstuffs—none.			
Peas and beans	do	4,320	4,320
Potatoes	do	6,559	3,280
Dried fruit	pounds	186,350	11,908
Vegetable food	tons	317,440	10,464,185
Tolls			469,009

All other agricultural products.

Cotton—none.			
Tobacco	pounds	254,595	25,460
Clover and grass seed	do	1,473,299	103,131
Flax seed	do	2,537,470	50,749
Hops—none.			
All other agricultural products		2,133	179,340
Tolls			2,909
Total agriculture	tons	351,327	14,391,002
Total tolls			536,088

MANUFACTURES.

Domestic spirits	gallons	1,010,121	191,925
Leather	pounds	384,316	69,177
Furniture	do	483,328	48,333
Bar and pig lead	do	94,171	3,767
Pig iron	do	127,006	1,905
Bloom and bar iron	do	46,292	2,083
Iron ware	do	270,729	10,829
Domestic woolens	do	14,502	14,502
Domestic cottons	do	6,566	1,313
Salt—none.			
Total manufactures	tons	4,753	343,832
Total tolls			9,263

Property cle[illegible] at Buffalo—Continued.

MERCHANDISE.	Quantity.	Value.
At 8 mills ....pounds........	86,927	$26,078
At 5 mills, viz:		
Sugar....................................do..........	20,263	2,026
Molasses.................................do..........	1,130	34
Coffee—none.		
Nails and spikes.........................do..........	99,542	4,977
Iron and steel...........................do..........	30,812	1,849
Crockery, oysters and clams—none.		
Total merchandise...................tons.........	119	34,964
Tolls		208
Other articles.		
Stone, lime, clay.......................pounds........	2,283,157	2,283
Gypsum—none.		
Mineral coal.............................do..........	6,899,000	13,798
Sundries.................................do..........	14,366,830	718,342
Other articles..		734 823
Tolls		11,236 80
Total.......................tons.........	451,179	16,[illegible]76,628
T[illegible] tolls..		609,518 80

Lake imports at Buffalo during the season of 1848.

The following statement embraces all the principal articles received at Buffalo during the seasons of 1846, 1847, and 1848, from points out of the district of Buffalo creek. This does not include, however, the articles received from ports within this district, which extends to the Pennsylvania line.

	1846	1847.	1848.
Flour ....barrels..	1,37[illegible]	1,856,819	1,248,618
Beef.	28,248	38,895	53,804
Pork and bacon...............................	80,090	63,768	65,894
Seed...	....	22,536	21,988
Meal...	4,381	21,533	3,361
Oil	781	2,685	2,635
Cranberries	2,143	3,147	....
Fish...	6,498	3,943	6,618
Wheat ....bushels..	4,744,184	6,488,657	4,519,304
Corn...	1,445,258	2,862,271	2,297,328
Barley.......................................	47,530	12,709	26,504
Rye	28,250	70,7[illegible]	17,807
Oats	218,300	445,095	560,052
Ashes................................casks..	24,612	7,338	9,938
High-wines...................................	15,000	18,100	38,736
Staves...................................M..	10,762,500	8,799,956	8,090,451
Lumber................................feet..	34,536,829	17,313,655	21,424,673
Tobacco.........................hogsheads..	3,022	1,112	385
Lead..................................pigs..	25,900	16,748	27,953
Iron..................................tons..	2,290	3,857	4,130
Coal...	4,330	7,716	12,943
Leather..............................rolls..	9,090	4,960	3,311
Hides...................................No..	50,535	64,223	70,715
Wool.................................bales..	21,100	29,238	40,022
Cotton	633	967	314
Hemp...	26,021	1,062	865
Butter ....pounds..	3,509,900	5,079,194	6,872,046
Lard...	6,099,171	3,[illegible],814	6,631,257
Tallow	803,860	602,940	897,256
Bacon	....	3,292,090	3,299,423
Eggs	....	726	2,537
Broom corn	....	....	2,284

CLEVELAND, OHIO.

LAKE COMMERCE OF CLEVELAND.

[From the Cleveland Herald.]

Imports coastwise at the port of Cleveland during the season of navigation of the year 1848.

Species of property.		Quantity.	Value.
Salt	barrels	105,608	$118,810
Lumber	M feet	6,647	46,459
Shingles	M	2,152	4,304
Shingle wood	cords	269	1,126
Lake fish	barrels	5,553	22,212
Merchandise	tons	19,936	1,993,675
Merchandise	packages	68,443	1,711,075
Staves	M	300	12,000
Pig iron	tons	236	6,030
Plaster and water lime	barrels	512	768
Articles unenumerated			207,120
			4,123,639

Custom-house, *Cleveland, January* 1, 1849.

G. B. TIBBITS, *Deputy Collector.*

Exports coastwise from the port of Cleveland during the season of navigation of the year 1848.

Species of property.		Quantity.	Value.
Flour	barrels	466,429	$2,332,145
Wheat	bushels	1,232,620	1,232,627
Corn		662,162	331,081
Oats		251,707	63,676
Pork	barrels	25,553	246,415
Butter	packages	19,273	186,055
Lard		7,135	59,052
Lard	tons	118¼	14,220
Whiskey and high-wines	barrels	28,450	227,600
Ashes		440	8,800
Nails	kegs	8,283	33,140
Coal	tons	8,813	22,032
Iron, nails and glass		3,899	389,900
Iron	pounds	16,284	19,170
Pig iron	tons	2,187	80,830
Glass	boxes	5,484	6,851
Merchandise	packages	2,431	30,015
Salt	barrels	2,900	3,262
Staves	M.	773	30,920
Beef	tierces	6,731	67,410
Cheese	boxes	11,511	23,022
Articles unenumerated			587,899
			6,000,000

Custom-house, *Cleveland, January* 1, 1849.

G. B. TIBBITS, *Deputy Collector.*

Importations of foreign products from Canada into the district of Cuyahoga during the season of navigation of the year 1848.

Species of property.		Quantity.	Value.
Lumber	feet	[illegible],413	$[illegible],841 05
Shingles	M	2,257½	2,411 13
Shingle wood	cords	1,070	3,303 30

Lake commerce of Cleveland—Continued.

Species of property.		Quantity.	Value.
Spars, pine		205	$250 24
Cedar wood, posts		45 cds. 727 ps.	147 89
Beeswax	pounds	54	7 99
Woolen cloth	yards	13½	25 82
Plaster	tons	92,1225-2000	285 18
Fish oil	barrels	146	1,783 92
Mackerel		300	905 48
Pig iron		59t. 7 cwt. 2 qr.	1,095 51
Porter	dozen bottles	3	12 78
Building stone	toise	32½	68 65
Salt	barrels	402	363 87
Merchandise, dry goods	packages	3	106 59
Brandy, 1 hogshead	gallons	79	94 00
Wine, 2 quarter casks		66½	129 21
Potatoes	bushels	43	11 41
Oat meal	barrels	5	27 63
Animals	horses	1	25 62
Peas	bushels	25	10 44
Sheep skins		100	20 50
Sheep		2	1 58
Wool	pounds	114	9 35
			23,939 23

Custom-house, *Cleveland, January* 1849.

G. B. TIBBITS, *Deputy Collector.*

Exports to Canada during the season of navigation of the year 1848, *from the port of Cleveland.*

Species of property.		Quantity.	Value.
Flour	barrels	6,571	$29,642
Pork		1,885	15,985
Corn	bushels	29,415	11,982
Coal	tons	2,648	6,622
Beef	tierces	150	1,950
Tallow	casks	1,420	26,728
Wheat	bushels	35,186	31,668
Corn meal	barrels	787	1,967
Lard		109	1,090
Salt		280	1,090
Fruit trees	bundles	65	211
Whiskey	barrels	50	400
Clover seed		81	894
Hemp	pounds	55	450
Groceries and sundries			12,431
			112,372

Number of vessels and their tonnage employed in foreign commerce during the year 1848, *district of Cuyahoga.*

Entered.	Tonnage.	Cleared.	Tonnage.
76 British vessels	8,454	72 British vessels	8,264
106 American vessels	9,972	74 American vessels	6,107
182	18,426	146	14,371

Custom-house, *Cleveland, January* 1, 1849.

G. B. TIBBITS, *Deputy Collector.*

CANAL COLLECTOR'S OFFICE, *Cleveland, January* 1, 1849.

Statement of some of the principal articles of property that arrived at or were cleared from Cleveland, by way of the Ohio canal, during the years 1847 *and* 1848.

ARRIVED.

		1847.	1848.
Flour	barrels	644,913	417,524
Pork	do	16,641	26,111
Whiskey	do	29,310	41,135
Linseed oil	do	1,512	1,512
Pot and pearl ashes	pounds	158,692	64,384
Pig iron	do	4,401,014	7,077,964
Butter	do	2,203,705	2,554,394
Bacon	do	1,596,458	1,820 155
Lard	do	1,010,437	1,636,803
Tallow	do	190,178	206,828
Iron and nails	do	15,103,563	15,674,789
Wool	do	1,443,428	1,407,261
Mineral coal	bushels	1,238,622	1,925,451
Corn	do	1,381,291	651,454
Oats	do	54,764	165,955
Wheat	do	2,130,317	1,585,270
Staves and heading	pieces	274,701	427,241
Stone	perches	8,854	10,182
Wood	cords	5,391	4,965

CLEARED.

		1847.	1848.
Salt	barrels	37,870	72,400
Lake fish	do	10,283	9,782
Merchandise	pounds	15,052,020	13,832,416
Furniture and baggage	do	755,409	678,103
Gypsum	do	2,563,999	2,559,756
Castings	do	1,034,156	1,096,026
Machinery	do	211,087	172.760
Ohio saleratus	do	422,988	471,753
Pot and pearl ashes	do	334,740	268,537
Other salts of ley	do	143,914	56,756
Marble	do	1,085,783	1,563,080
Hides and skins	do	147,214	128.886
Clocks	do	107,553	58,128
Grindstones	do	28,258	145,727
Lumber	feet	3,132,667	4,906,920
Shingles		2,939,400	4,556,250
Split hoops		1,598,120	1,840,826

The amount of toll collected at this office during the past year is	$80,510 25
Do do do year 1847 was	65,963 75
Increase	14,546 50

D. H. BEARDSLEY, *Collector.*

MISSOURI.

The following statistics are taken from the annual review of the trade and commerce of St. Louis for the year 1848, compiled for the Missouri Republican.

Imports into St. Louis for the years 1846, 1847, *and* 1848, *commencing January* 1, *and ending December* 31.

		1848.	1847.	1846.
Apples, green	barrels	12,628	2,128	3,728
Beef	tierces	9,369	5,735	....

Imports into St. Louis—Continued.

	1848.	1847.	1846.
Beef........................barrels......	7,866	4,720	1,716
Beef...................half barrels......	87	....	169
Bacon.......................casks......	25,820	14,425	11,803
Bacon.....................hogsheads......	3,603	....	....
Bacon......................barrels......	2,847	....	....
Bacon.......................boxes......	3,775	1,289	618
Butter.................hogsheads......	66	....	....
Butter.....................barrels......	2,200	1,081	823
Butter..............kegs and jars......	8,131	4,199	3,940
Brooms......................dozen......	6,744	....	....
Beeswax....................barrels......	300	759	476
Beeswax.............boxes and sacks......	430	798	646
Bagging.....................pieces......	1,084	1,442	3,243
Beans....................hogsheads......	79	....	....
Beans......................barrels......	3,258	5,337	4,370
Beans.......................sacks......	2,003	4,134	2,199
Bran.........................tons......	30	....	....
Bran........................sacks......	63,726	....	....
Barley.....................bushels......	111,003	114,680	20,277
Buffalo robes...............packs......	15,188	....	....
Buffalo robes...............loose......	2,227	7,782	16,717
Corn.......................bushels......	699,693	1,016,318	688,649
Castings.....................tons......	428	1,761	1,604
Cheese......................casks......	84	236	430
Cheese......................boxes......	8,333	12,150	11,232
Cider.......................barrels......	1,180	336	421
Coffee......................sacks......	78,842	77,767	65,128
Cotton yarns................packs......	11,480	12,762	13,260
Flour......................barrels......	387,314	328,568	220,457
Flour..................half barrels......	541	686	1,059
Furs.....................packages......	1,194	2,118	3,011
Feathers....................sacks......	856	384	768
Flaxseed...................barrels......	4,908	4,992	3,693
Flaxseed....................sacks......	7,349	....	....
Ginseng....................barrels......	119	14	19
Ginseng.....................sacks......	33	253	58
Glass.......................boxes......	19,834	18,722	24,630
Hemp........................bales......	47,270	72,222	33,853
Hides..............................	62,097	71,877	63,396
Iron, bar....................tons......	6,341½	15,070	2,484
Iron, pig......................do......	4,463	2,729	2,326
Lead, pigs.........................	705,718	749,128	730,829
Lead, bar....................pounds......	....	....	7,621
Lard.......................barrels......	67,339	32,021	26,462
Lard.........................kegs......	14,180	8,595	14,730
Lard........................tierces......	6,579	150	....
Whiskey....................barrels......	29,758	22,239	29,882
Brandy.........................do......	3,333	1,116	1,698
Wine...........................do......	7,177	2,611	3,690
Malt liquors.......................	4,282		
Lead, white..................kegs......	2,247	5,256	3,466
Molasses...................barrels......	21,948	21,554	14,996
Nails........................kegs......	49,596	22,589	28,073
Oil, linseed...............barrels......	1,609	485	826
Oil, castor....................do......	510	332	95
Oil, lard......................do......	493	478	292
Onions.........................do......	873	1,580	463
Onions......................sacks......	9,931	2,672	4,752
Oakum......................barrels......	816	1,072	1,378
Oats.......................bushels......	213,700	202,365	95,612
Pork.......................barrels......	97,662	43,314	48,931
Pork...................half barrels......	1,923	288	39
Pork, bulk..................pounds......	8,451,000	285,797	630,765
Potatoes...................barrels......	2,424	2,832	3,625
Potatoes....................sacks......	75,214	24,076	26,979
Peltries..................packages......	1,889	2,697	1,266

Imports into St. Louis—Continued.

		1848.	1847.	1846.
Rice	tierces	918	762	916
Rye	bushels	9,075	7,566	5,283
Rope	hoop coils	12,633	10,798	5,123
Shot	kegs	323	....	28
Shot	bags	....	88	1,026
Salt	barrels	38,800	44,380	85,948
Salt	sacks	204,744	106,392	177,724
Sugar	hogsheads	26,116	12,671	11,603
Sugar	barrels	7,946	4,033	4,400
Sugar, Havana	boxes	6,866	15,028	1,352
Tallow	casks	398	112	303
Tallow	barrels	797	2,217	1,114
Tar	barrels	5,027	2,217	1,538
Tar	kegs	2,360	5,456	5,776
Tobacco	hogsheads	9,044	11,015	8,588
Tobacco, manufactured	boxes	5,446	6,548	7,903
Tea	chests	2,384	3,028	3,049
Vinegar	barrels	606	1,233	1,086
Wheat	bushels	2,194,789	2,432,377	1,838,926

Below we annex a table showing the aggregate receipts of twenty of the leading articles of produce for the past five years.

Tobacco	hogsheads	49,918
Tobacco	boxes	36,024
Hemp	bales	253,634
Lead	pigs	3,528,566
Flour	barrels	1,164,502
Flour	half barrels	3,379
Wheat	bushels	8,157,780
Oats	do	574,269
Barley	do	286,669
Rye	do	[illegible]25,039
Corn	do	2,569,302
Beans	barrels	16,574
Beans	sacks	10,045
Beef	tierces	15,124
Beef	barrels	23,836
Beef	half barrels	418
Pork	barrels	235,644
Pork	half barrels	2,361
Pork	pounds	9,772,649
Bacon	casks	80,846
Bacon	barrels and boxes	9,064
Lard	barrels	145,949
Lard	kegs	57,364
Lard	tierces	6,733
Tallow	casks	920
Tallow	barrels	5,624
Butter	hogsheads	66
Butter	barrels	5,283
Butter	kegs and jars	22,789
Whiskey	barrels	136,177
Hay	bales	12,964
Bagging	pieces	13,096
Bale rope	coils	49,638

Value of foreign merchandise imported into St. Louis during the year 1848, and entered immediately for consumption—$107,818, *viz:*

From England	$77,742 00
From Germany	18,482 00
From France	5,397 00
From Spain	4,197 00
Total	107,818 00

Paying duty to the United States, of $32,086 57.

Value of merchandise imported into St. Louis, and warehoused during the year 1848, $36,930.

With the view of showing to some extent the value of the produce annually received at this port, we have compiled the annexed table, which exhibits the aggregate amount and estimated value of thirty of the leading articles of produce during the year 1848. The average rate we have in all instances placed at the lowest estimate, wishing rather to be below than above the proper value of all the articles mentioned. The figures, however, are before the reader, and he can judge and think for himself:

Estimated value of thirty of the leading articles of produce received at the port of St. Louis, from the 1st of January to the 31st of December, 1848.

Articles.	Aggregate am't.	Average rate.	Estimated value.
Tobacco, leaf, hogsheads	9,044	$45 00 per hogshead	$406,980 00
manufactured, boxes	5,446	13 20 per box	71,887 00
Hemp, tons	9,454	85 00 per ton	802,590 00
Lead, tons	24,200	74 00 ....do	1,790,800 00
Flour, barrels	387,584	4 25 per barrel	1,637,232 00
Wheat, bushels	2,194,789	70 per bushel	1,526,352 30
Corn ....do	699,693	28 ....do	195,914 04
Oats ....do	243,700	21 ....do	51,177 00
Barley ....do	111,003	38 ....do	42,181 14
Rye ....do	9,075	35 ....do	3,176 25
Beans ....do	14,196	40 ....do	5,678 40
Beef, tierces	9,369	8 50 per tierce	79,636 50
barrels	7,866	6 50 per barrel	51,129 00
half barrels	87	3 28 per half barrel.	282 75
Pork, tierces	1,074	10 00 per tierce	10,740 00
barrels	96,618	7 50 per barrel	724,635 00
half barrels	1,923	3 75 per half barrel.	7,136 25
pounds bulk	8,454,000	2½ per pound	211,250 00
Lard, tierces	6,579	17 50 per tierce	113,132 50
barrels	67,329	13 50 per barrel	908,941 50
kegs	14,180	3 50 per keg	49,630 00
Bacon, casks	25,820	28 00 per cask	722,960 00
hogsheads	3,603	38 50 per hogshead	138,515 50
barrels	2,847	7 00 per barrel	19,929 00
boxes	3,775	14 00 per box	52,858 00
Whiskey, barrels	29,758	6 80 per barrel	201,454 40
Tallow, pounds	483,920	6½ per pound	31,454 80
Butter, pounds	1,106,240	9 ....do	99,561 60
Bale rope, coils	12,633	7 25 per coil	91,589 25
Bagging, pieces	1,084	14 00 per piece	15,176 00
Potatoes, bushels	157,697	30 per bushel	47,309 10
Onions, bushels	22,481	35 ....do	7,868 35
Grease, pounds	201,350	3½ per pound	7,092 25
Hides, green	10,458	1 50 each	15,687 00
dry	51,639	1 62 ..do	82,655 18
Hay, tons	845	12 00 per ton	10,144 00
Flaxseed, bushels	32,460	80 per bushel	25,968 00
Feathers, pounds	51,360	20 per pound	10,272 00
Brooms, dozen	6,713	1 25 per dozen	8,391 25
Dried fruit, bushels	47,605	85 per bushel	40,464 25
Green fruit, barrels	12,628	1 50 per barrel	18,792 00
Wool, bales	904	22 50 per bale	20,330 00
Total estimated value			10,358,946 56

Exports for three years, commencing January 1, 1846.

Articles.	1848.	1847.	1846.
Bacon, assorted, casks	29,206	14,085	13,641
barrels	6,731	4,092	4,916
bulk, tons	1,113	675	569
Beef, barrels	16,008	12,798	20,113
Bagging, pieces	4,217	3,363	4,784
Bale rope, coils	13,362	12,632	10,016

Exports—Continued.

Articles.	1848.	1847.	1846.
Beeswax, barrels	667	721	913
Beans, barrels	4,528	4,490	4,468
Buffalo robes, bales	5,322	3,879	3,630
Corn, sacks	314,894	395,683	243,026
Flour, barrels	412,672	448,614	359,858
Hides...do	39,728	73,586	44,962
Hemp, bales	40,393	65,752	31,352
Lead, pigs	557,644	591,791	663,505
Lead, bar, boxes	2,041	3,136	2,932
Lard, barrels	95,719	39,543	26,412
kegs	28,354	21,344	32,729
Oats, sacks	103,203	16,957	41,176
Oil, linseed, barrels	684	1,067	522
castor, barrels	873	933	1,269
lard, barrels	2,051	....	619
Pork, barrels	96,656	56,467	62,820
bulk, tons	2,038	661	805
Rye, sacks	4,384	2,250	1,107
Shot, kegs	2,314	2,506	4,122
Skins, deer, packs	2,051	3,700	2,102
Seed, flax, tierces	1,655	660	1,118
Tobacco, hogsheads	8,875	9,881	8,450
manufactured, boxes	5,963	4,841	6,183
Tallow, barrels	846	2,092	5,955
Wheat, barrels	9,786	10,318	16,231
sacks	177,013	640,239	217,319
Wool, bales	1,168	1,414	1,335

[*St. Louis Price Current, January* 13.

Arrivals of steamboats, barges, flats, and keels, with their respective tonnage, harbor master's fees, &c., for 1848.

Steamboats and barges	3,468
Flats and keels	332
Tonnage of steamboats and barges	688,213
Wharfage	$35,531 15
Harbor master's fees	2,842 44
Paid into the city treasury	$32,688 71

Comparative arrivals of steamboats at the port of St. Louis, from New Orleans, Cairo, the Ohio, Upper Mississippi, Illinois, and Missouri rivers, and all other points, during the years 1846, 1847, *and* 1848.

	New Orleans.			Ohio.			Illinois.			Upper Mississippi			Missouri.			Cairo.			Other points.		
	1846.	1847.	1848.	1846.	1847.	1848.	1846.	1847.	1848.	1846.	1847.	1848.	1846.	1847.	1848.	1846.	1847.	1848.	1846.	1847.	1848.
January	15	22	29	8	8	11	3	9	26	5	4	24	7	.....	1	.....	11	13	15	5	16
February	33	15	26	26	16	12	42	8	33	31	8	20	1	1	1	.....	10	9	21	6	13
March	25	43	53	26	23	38	40	85	72	36	41	48	10	14	19	.....	3	15	21	13	29
April	27	77	47	35	41	43	44	91	67	55	74	76	20	32	33	.....	1	18	14	12	14
May	59	93	22	65	61	37	80	106	82	115	128	67	43	63	38	.....	19	7	10	20	36
June	36	49	30	52	37	44	51	60	53	98	91	75	47	48	39	.....	8	13	11	13	16
July	23	67	30	30	41	48	32	58	55	60	81	51	32	45	31	.....	19	5	16	19	28
August	32	24	26	41	37	55	32	41	71	56	51	75	29	32	40	.....	10	16	18	24	27
September	30	23	48	37	30	42	15	45	64	46	57	66	27	23	39	.....	18	21	16	28	64
October	32	22	51	48	67	43	41	57	70	61	80	82	18	31	36	.....	18	32	37	34	72
November	34	32	49	21	42	48	30	60	63	56	69	66	14	16	42	.....	13	16	27	18	38
December	49	23	35	27	22	8	36	38	34	44	33	47	8	9	5	.....	16	28	26	12	43
Total	395	502	426	420	430	429	446	658	690	663	717	697	256	314	327	.....	146	194	232	202	396

COMMERCE OF CHICAGO.

The Chicago Democrat contains an elaborate table of the commerce of that place. In 1830, Chicago was a mere trading post, where some one hundred persons, principally government agents, troops, Indian traders, &c., resided. In 1831, there was but one store in the place, and that was kept by G. W. Dole, inside of the pallisades of the fort. From that year until 1838, the post and country, to the distance of one hundred miles and over inland, were supplied with the necessaries of life—flour, corn, pork, beans, &c.—from the east, principally from Ohio. In 1839, the export trade commenced. That year a vessel, which went to Chicago laden with 700 barrels of flour, returned to Ohio without disposing of the article. This year, also, the first cargo of wheat was shipped from Chicago, by Giles Williams. The pile of wheat lay in a shanty where the Winslow warehouse now stands, and was quite a curiosity at the time. This was the commencement of the export trade, which, in 1842, ran up to 586,907 bushels of wheat and 2,920 barrels of flour. The exports have gone on increasing in the following ratio:

	Wheat.	Flour.	Beef and Pork.	Wool.
1846..................	1,459,590	23,045	31,269	281,225
1847..................	1,674,504	42,538	48,958	411,488

In 1846, the shipments of leading articles were as follows:

Wheat ....bushels..	1,459,594	Bacon and hams...pounds..	23,888
Oats ....do....	52,113	Tongues............do....	1,000
Corn.................do....	11,947	Wool ....do....	251,220
Flour..............barrels..	28,045	Raw furs ....do....	37,614
Beef and pork.......do....	31,221	Lead ....do....	10,395
Dried beef........pounds..	11,000	Hides and leather .. value...	$24,685
Lard and tallow .....do....	1,935		

This commerce in that year employed 19 steamers, 17 propellers, 36 brigs, and 120 schooners—an aggregate of 44,445 tons of shipping. The arrivals and departures of vessels were 3,779. There were imported that year the following quantities of lumber, shingles, &c.:

Lumber.............feet ..	24,424,000	Shingles	8,354,000
Lath	2,068,500	Square timber ....feet...	16,800
Staves.....................	15,280	Pickets	24,090

For the year 1847, the exports of leading articles were as follows:

Wheat ....bushels..	1,973,304	Flour.............barrels..	32,598
Corn ....do....	67,315	Beef.................do....	26,504
Oats ....do....	38,892	Pork.................do....	25,410

In 1848, (the present season,) the exports are as follows:

Wheat.............bushels..	1,680,855	High-wines ....barrels..	195
Corn.................do....	339,741	Beer ....do....	20
Oats.................do....	12,500	Mustard seed........do....	29
Barley...............do....	451	Grass seed..........do....	53
Potatoes ....do....	7,909	Flax seed...........do....	143
Flour.............barrels..	26,970	Apples ....do....	10
Corn meal..........bags...	1,207	Peaches ....do....	50
Beans ....barrels..	727	Eggs.................do....	11
Beef..............tierces..	3,536	Butter..............kegs...	315
Beef..............barrels..	16,129	Cheese ....boxes...	25
Pork ....do....	12,588	Oil...............barrels..	44
Lard ....do....	2,900	Water lime..........do....	105
Lard.................cans...	135	Candles ....boxes...	22
Tallow............barrels..	5,228	Soap ....do....	602
Tallow ....tierces..	224	Bones ....hogsheads	107
Hogs........................	666	Wool...............bales...	2,531
Hams	1,878	Hogs' hair ....do....	22
Hams..............tierces..	127	Feathers ....do....	97
Hams ....hogsheads	43	Furs.................do....	23
Bacon.................do....	44	Buffalo robes	24
Bacon ....tierces..	81	Rags	58
Bacon ....barrels..	167	Hemp........................	760
Jerked beef........boxes...	245	Deer skins	270
Sugar............hogsheads	68	Horse hair	22
Sugar ....barrels..	2,535	Hay ....tons...	14
Molasses.........hogsheads	2	Horses......................	75
Molasses.........barrels..	42	Fat cattle..................	87
Fish.................do....	1,090	Tabacco ....hogsheads	12
Salt ....do....	892	Cigars......................	2,000
Provisions...........do....	416	Hops ....barrels..	50
Whiskey..............do....	128	Brick	17,000
Ashes...............casks..	14		

INDEX.

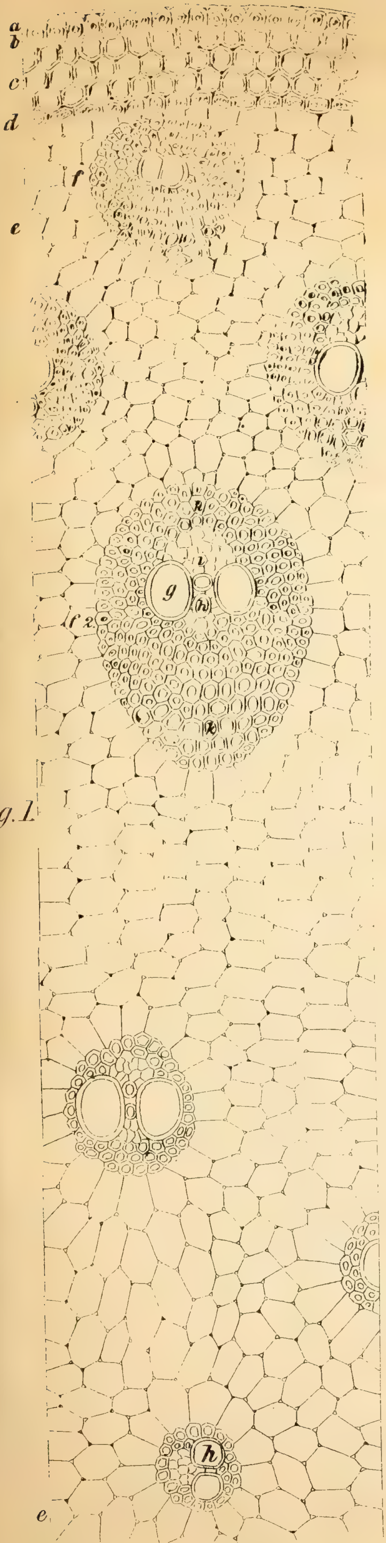


Fig.1

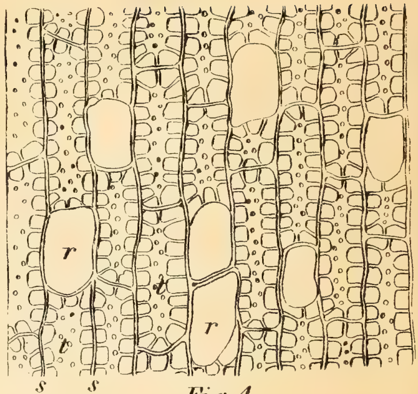


Fig.4.

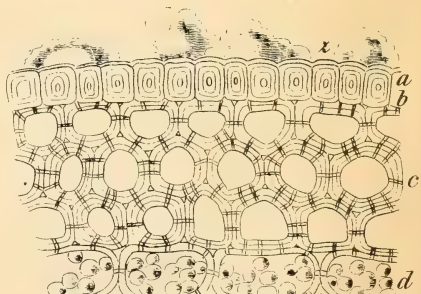


Fig. 5.

Corda delatur.

Butler & Illman

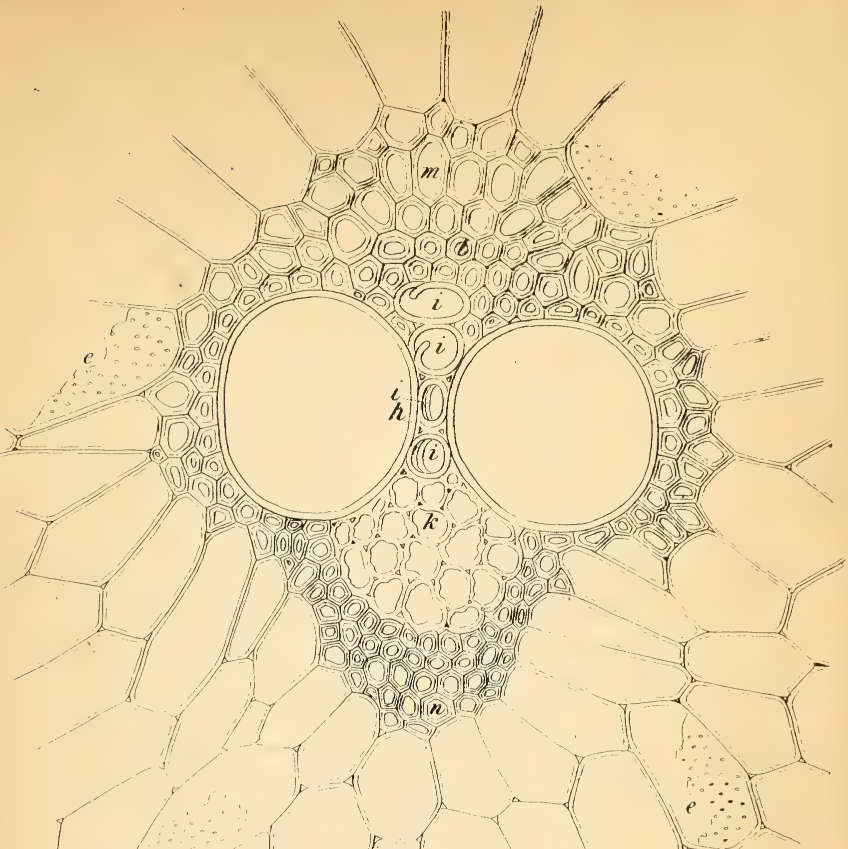


Fig. 2.

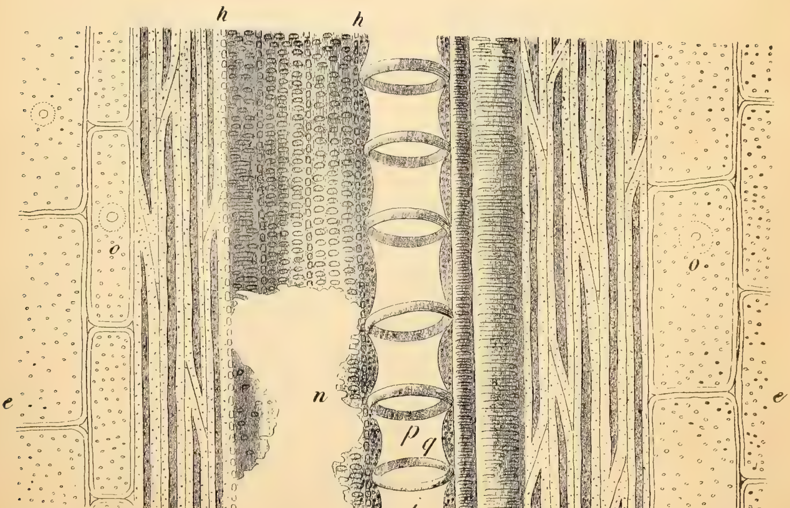


Fig. 3.

Corda delatur

Ch. L. Fleischmann

Ackerman's Lith. 120 Fulton St. N.Y.

Butler & Ilman

Fig. 6.

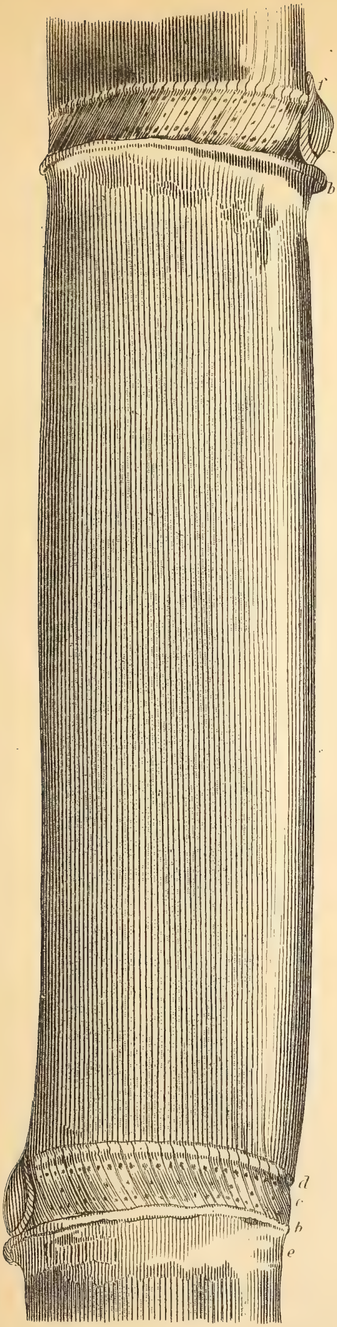


Fig. 7.

Fig. 8.

Fig. 9.

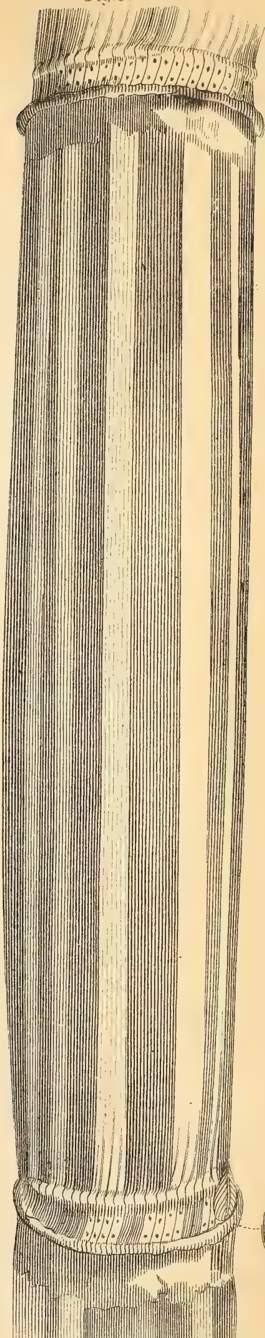


Fig. 10. 11.

Drawn by Fleischmann

Ackermans Lith. N.Y.

Fig 12

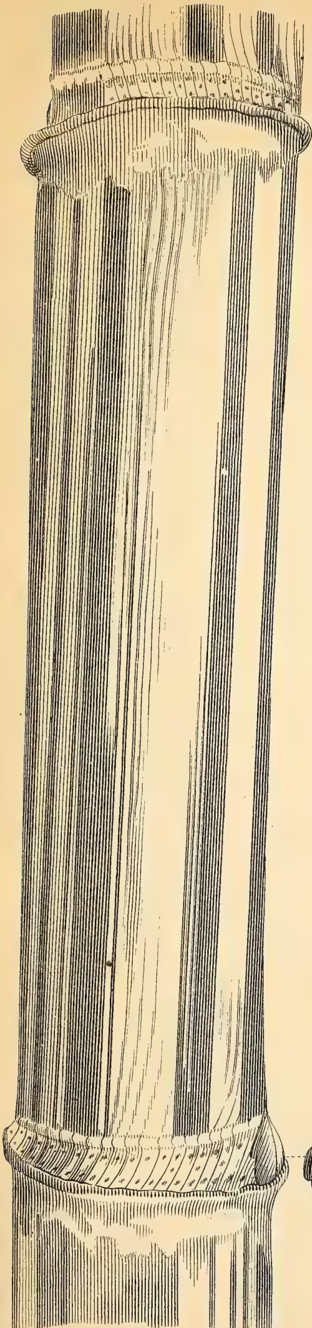


Fig 13

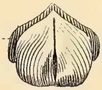
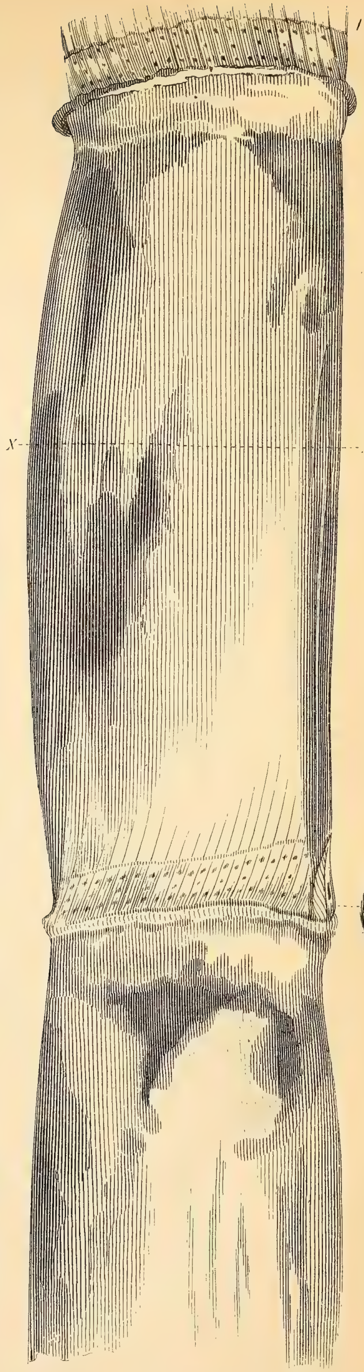


Fig. 14.

Fig 15



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Drawn by Ch. L. Fleischmann.

Ackermans Lith. 120 Fulton St. N.Y.

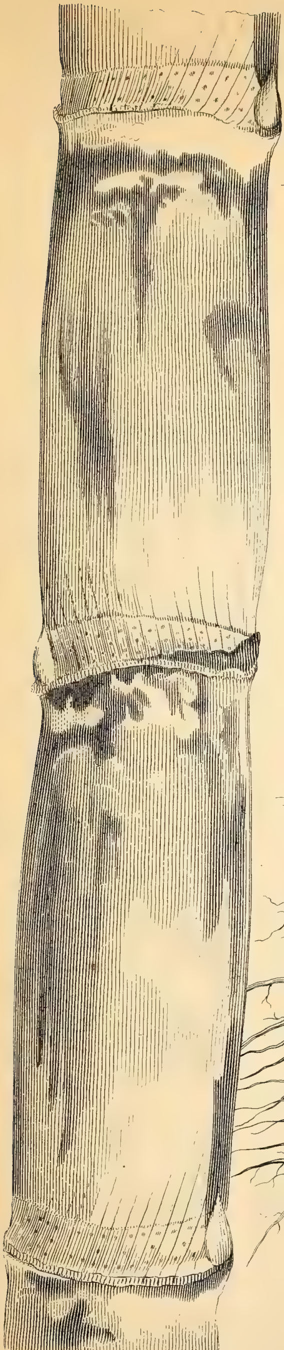
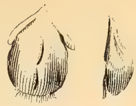


Fig 18

Fig^s 19 20



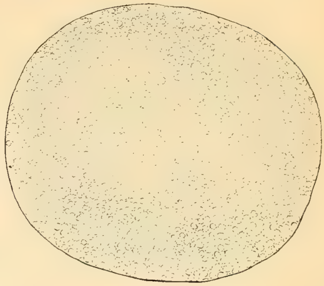


Fig 21

Section through X X.
Fig 15

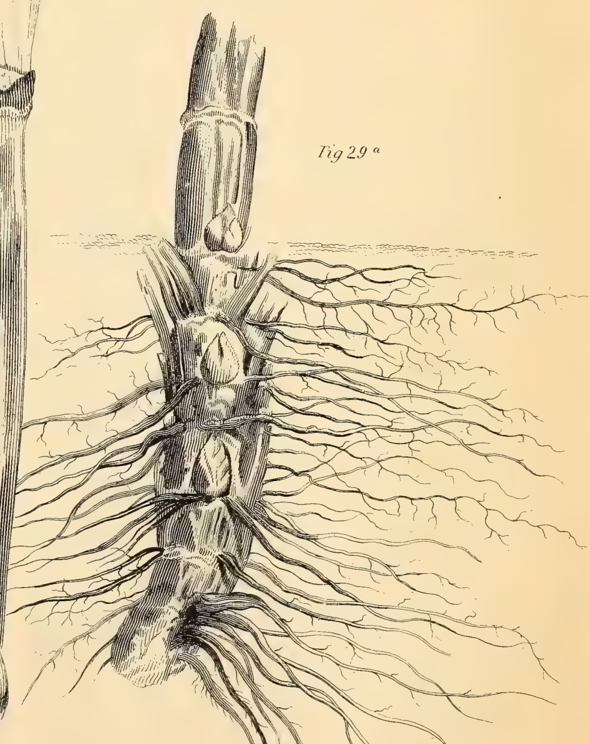


Fig 29 ^a

Drawn by Ch. L. Fleischmann

Ackerman's Lith. N.Y.

FIG. 23.

FIG. 25.

FIG. 24.

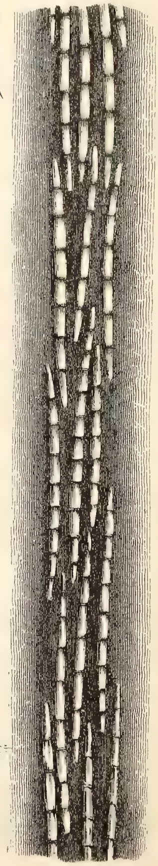
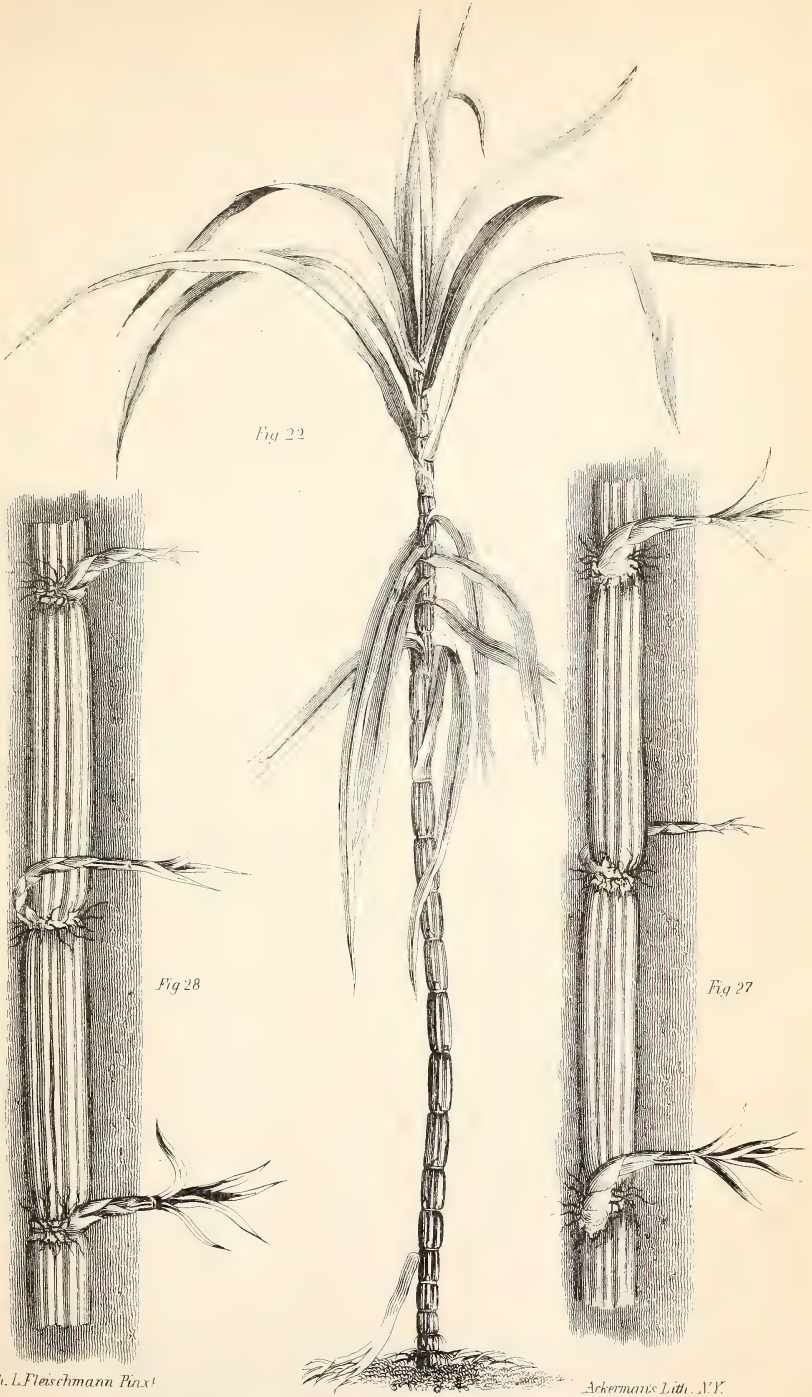


FIG. 26.

Ackerman's Lith. 120 Fulton St. N. Y.



Ch. L. Fleischmann Pinx[t]

Ackerman's Lith. N.Y.

RED RIBBON CANE

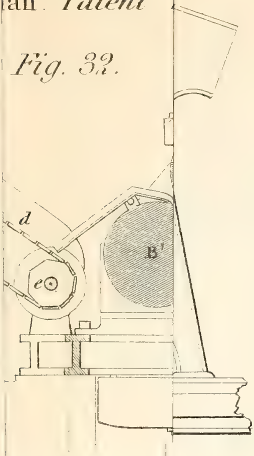
Fig. 29.

Drawn by Ch. L. Fleischmann

Ackerman's Lith. 120 Fulton St. N.Y.

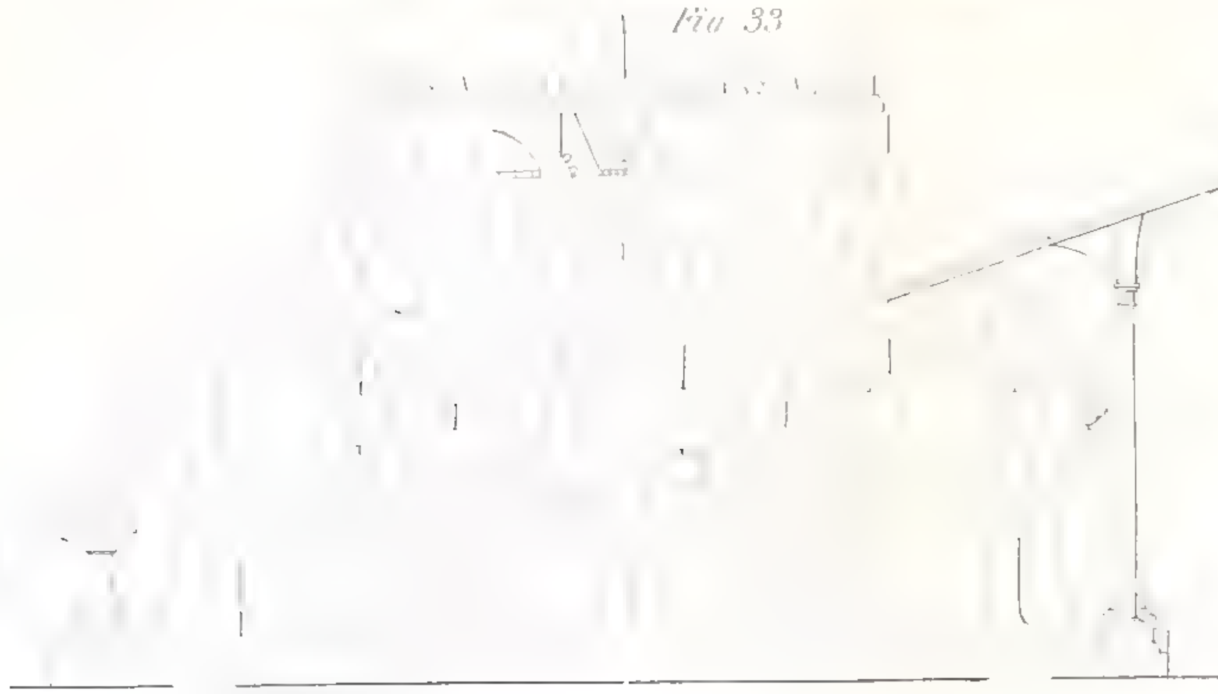
ıan. *Patent*

Fig. 32.



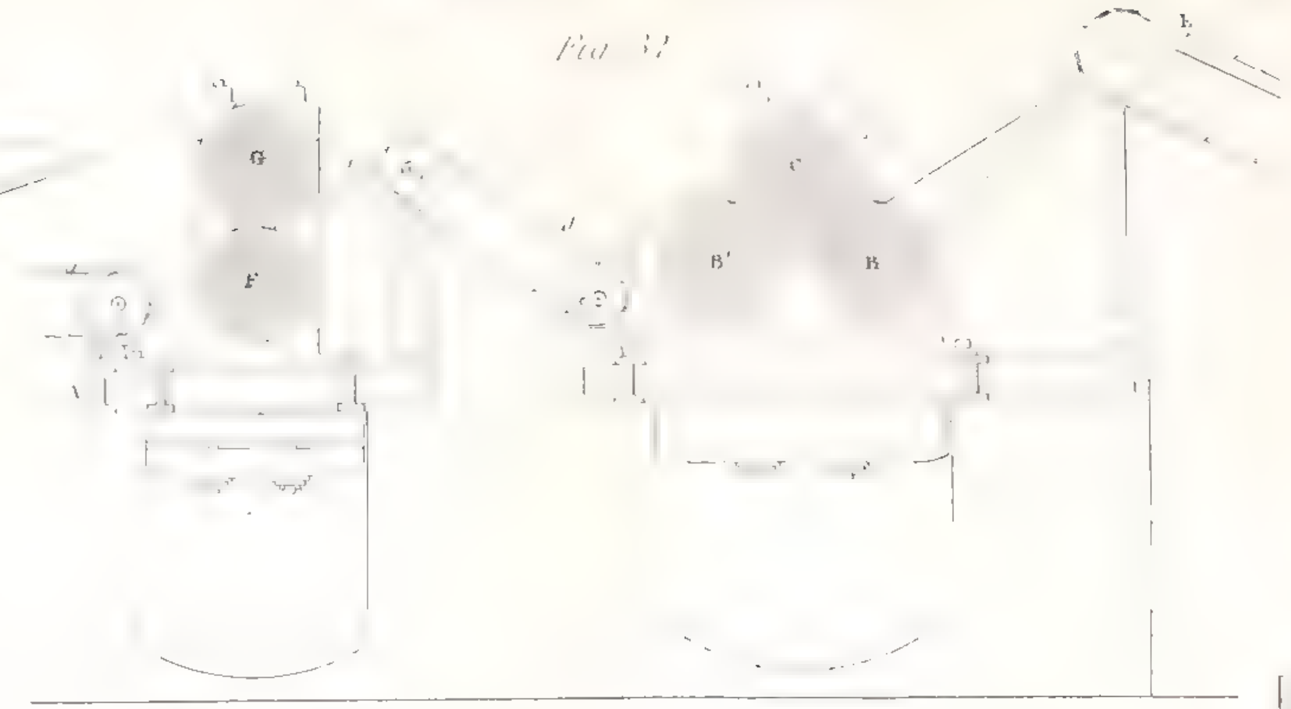
Mr Nillus's [illegible] for the French Colonies

Fig 33



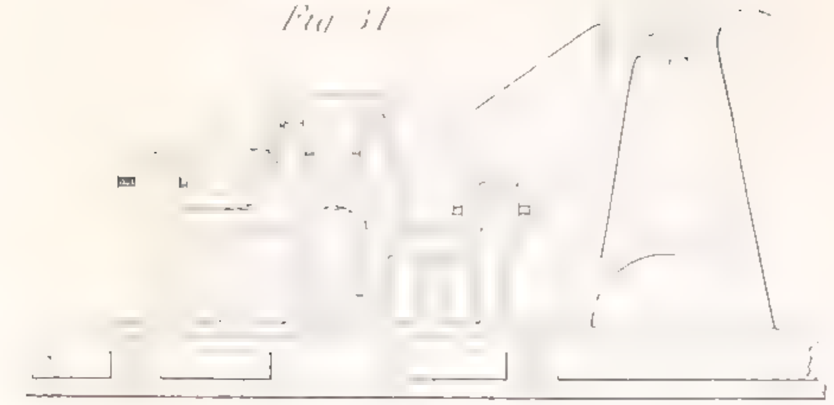
Alfred Stillman Patent Sugar Mill

Fig 32

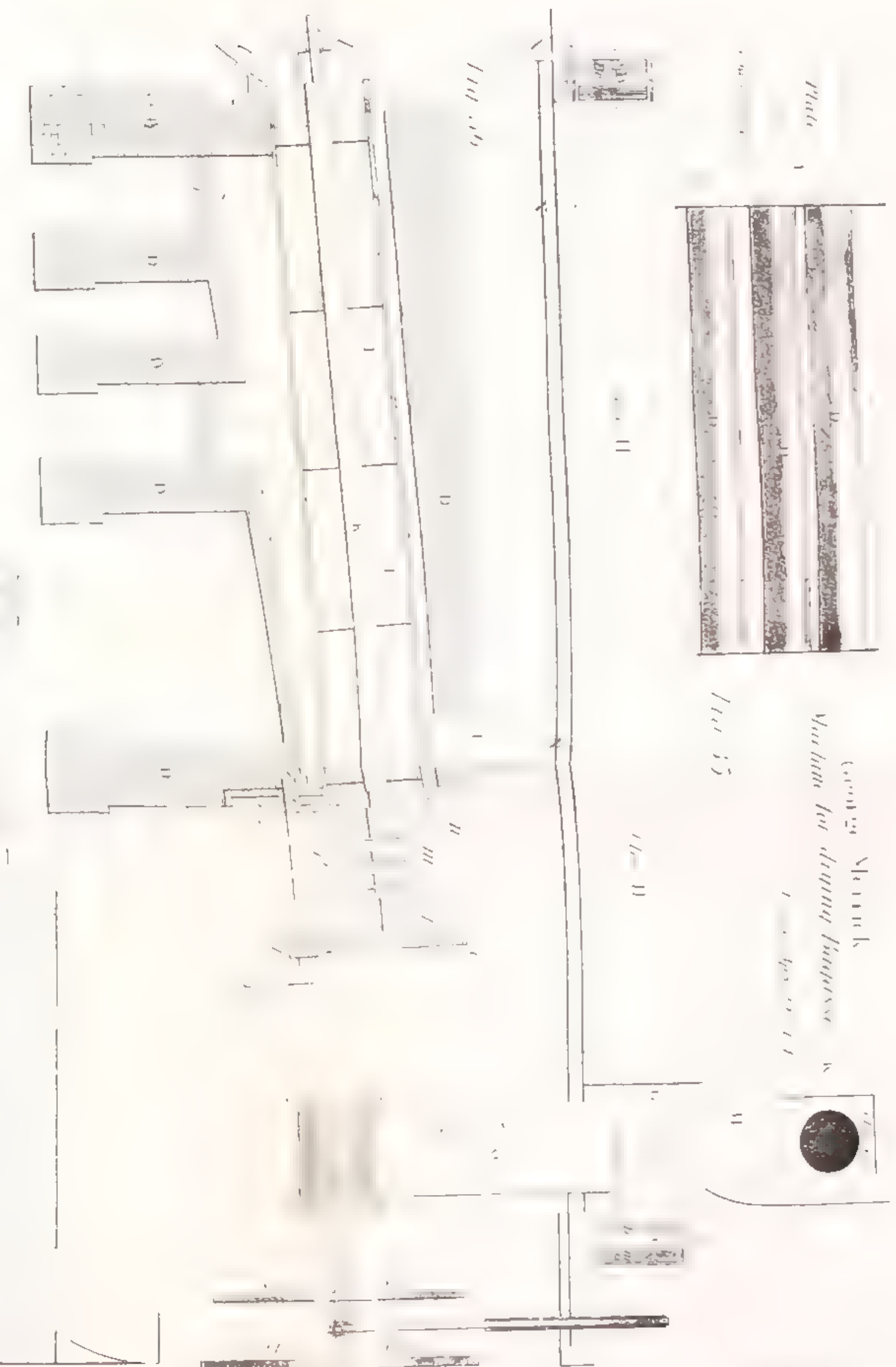


4 Roller Sugar Mill built by
[illegible] Morris & Co Philad.

Fig 34



Sugar Mill constructed by [illegible]



New Furnace for Revivification of Bone black

Fig. 38.

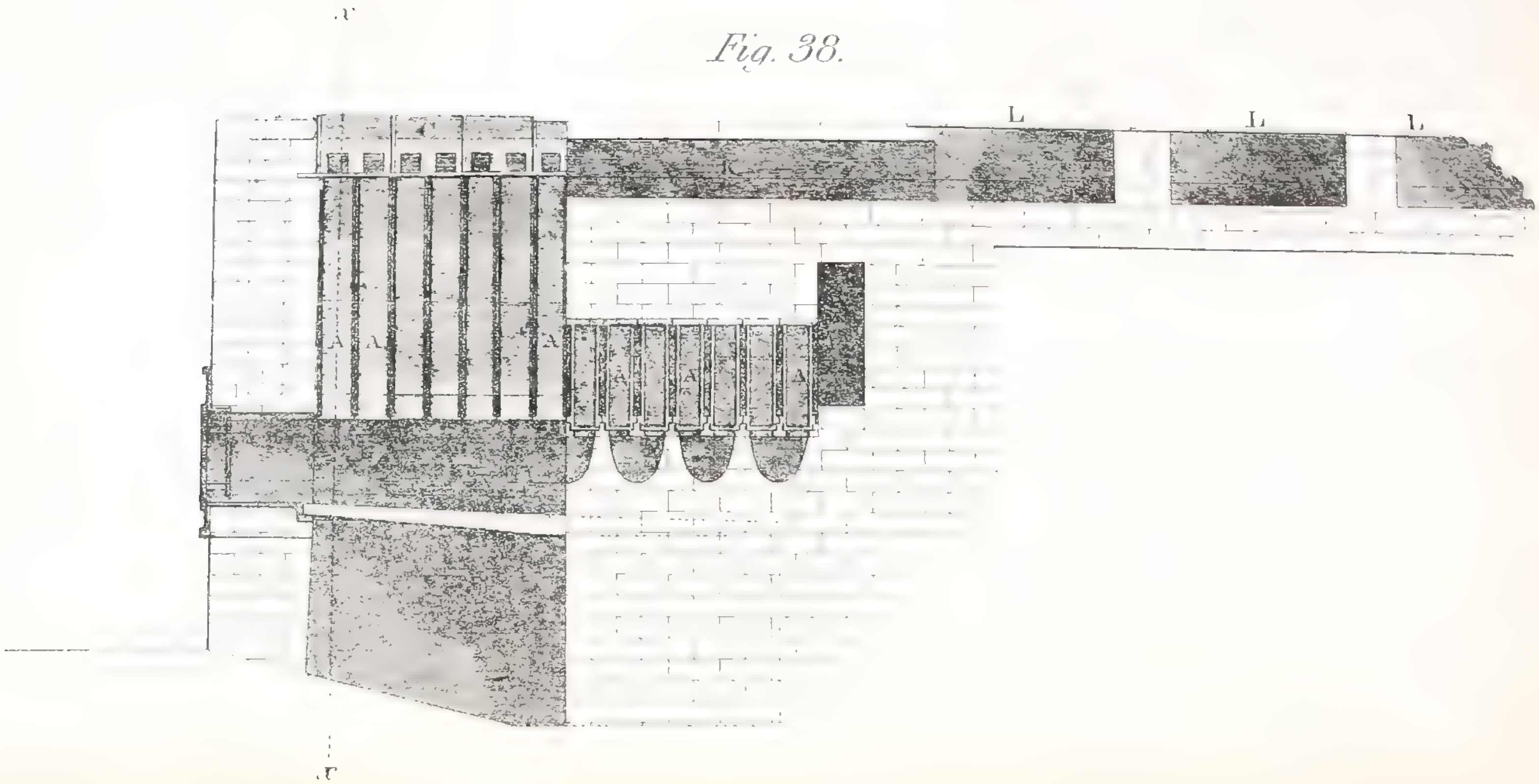
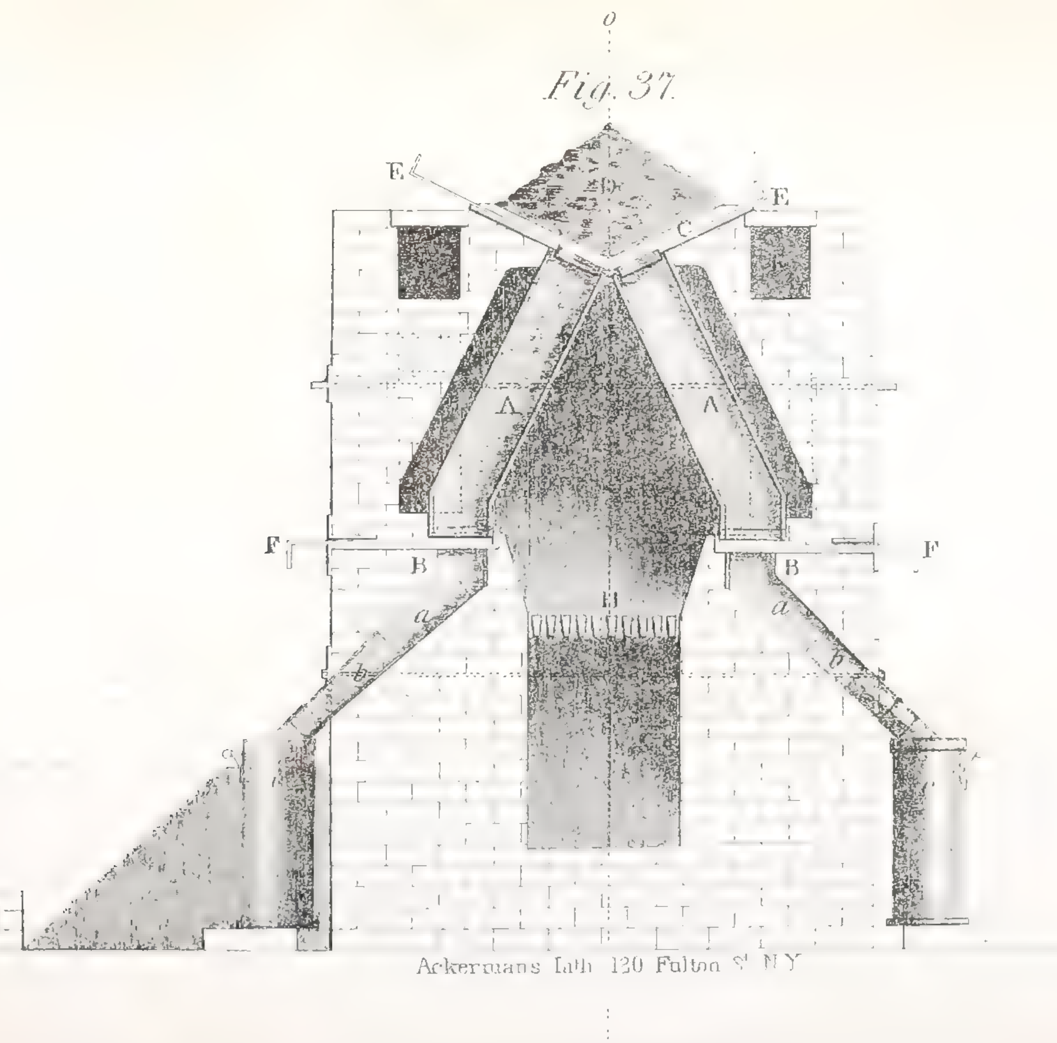


Fig. 37.

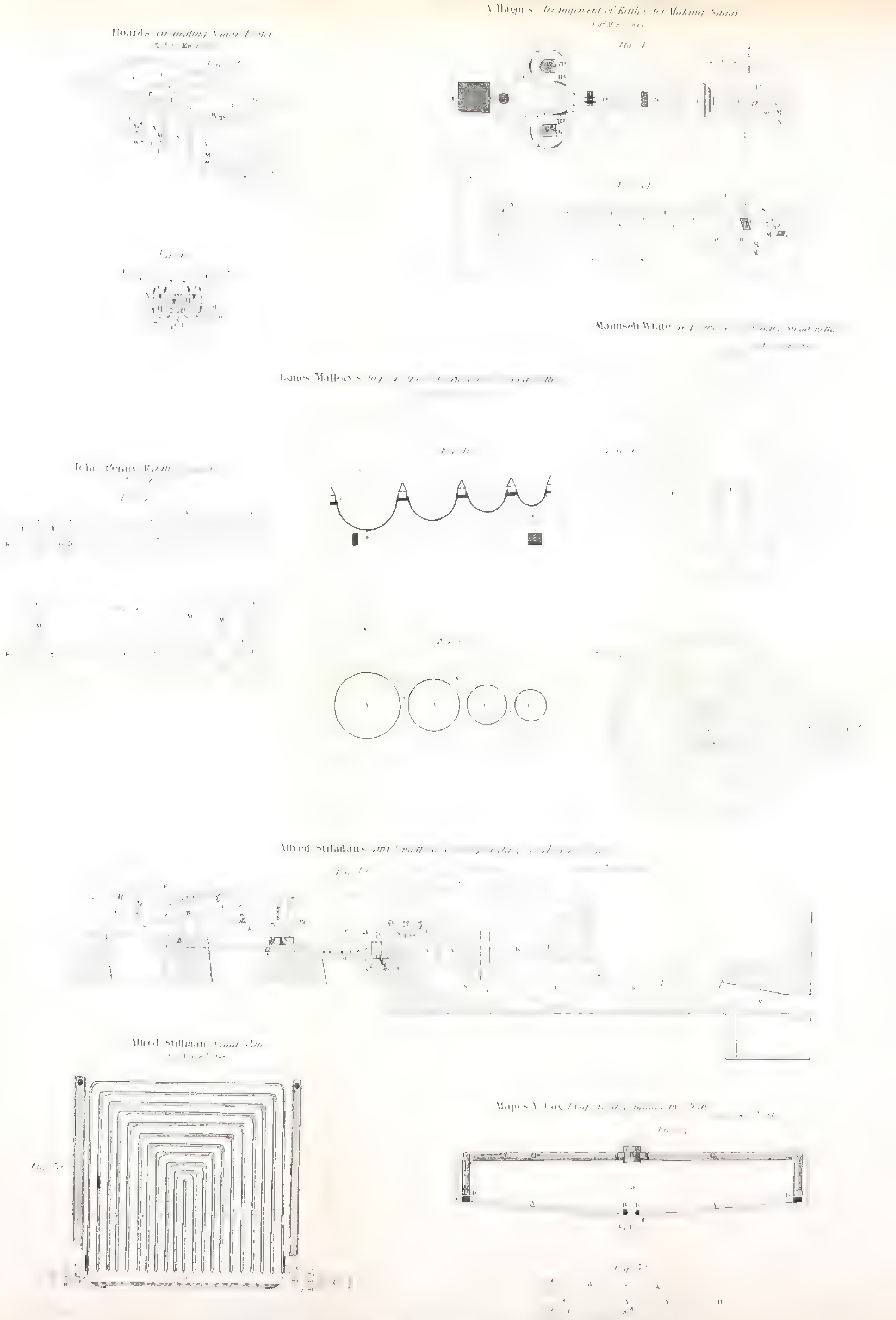


Ackermans lith 120 Fulton St N Y

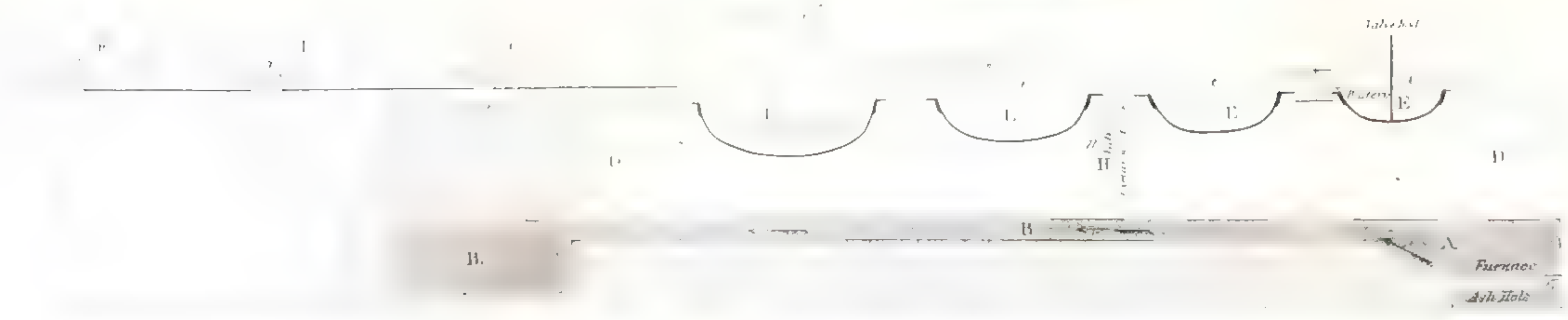
Ch. L. Fleischmann

Butler & Ullman

Drawn by B. Andrade Engineers


Arrangement of Kettles for Making Sugar
Maunsell White
James Mallory's
Alfred Stillman's
Alfred Stillman Sugar Pan
Mapes & Cox

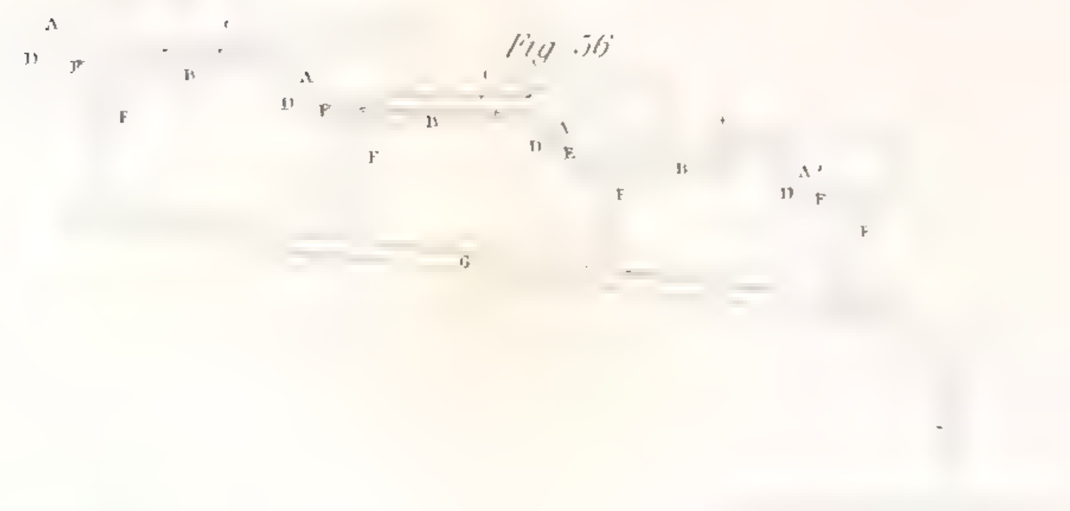
Duplessis's Steam Apparatus for making Sugar



Wm. Graham's Apparatus for boiling Sugar

Patented March 10th 1840

Fig 56



Degrand's Apparatus for Manufacturing Sugar

Fig 54

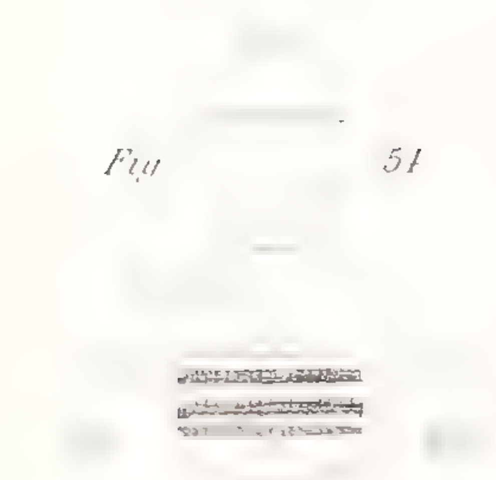
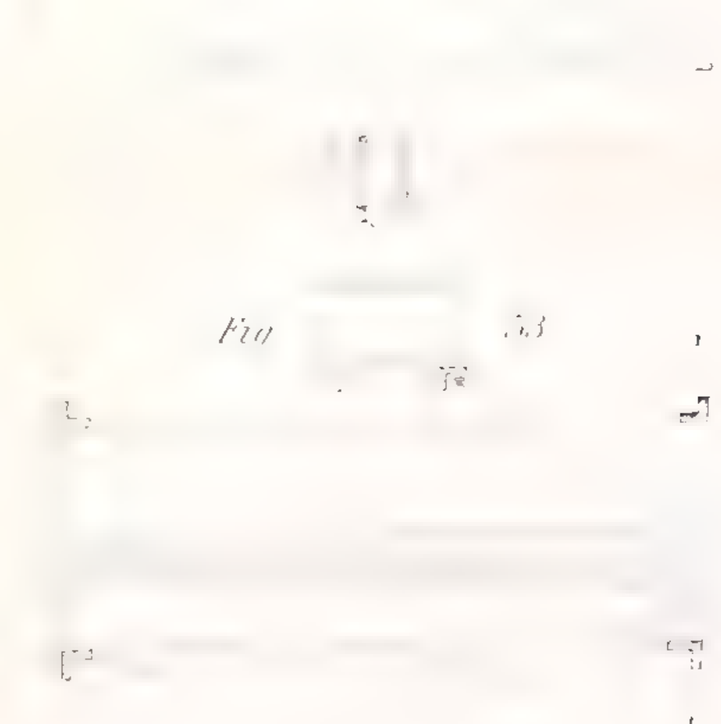


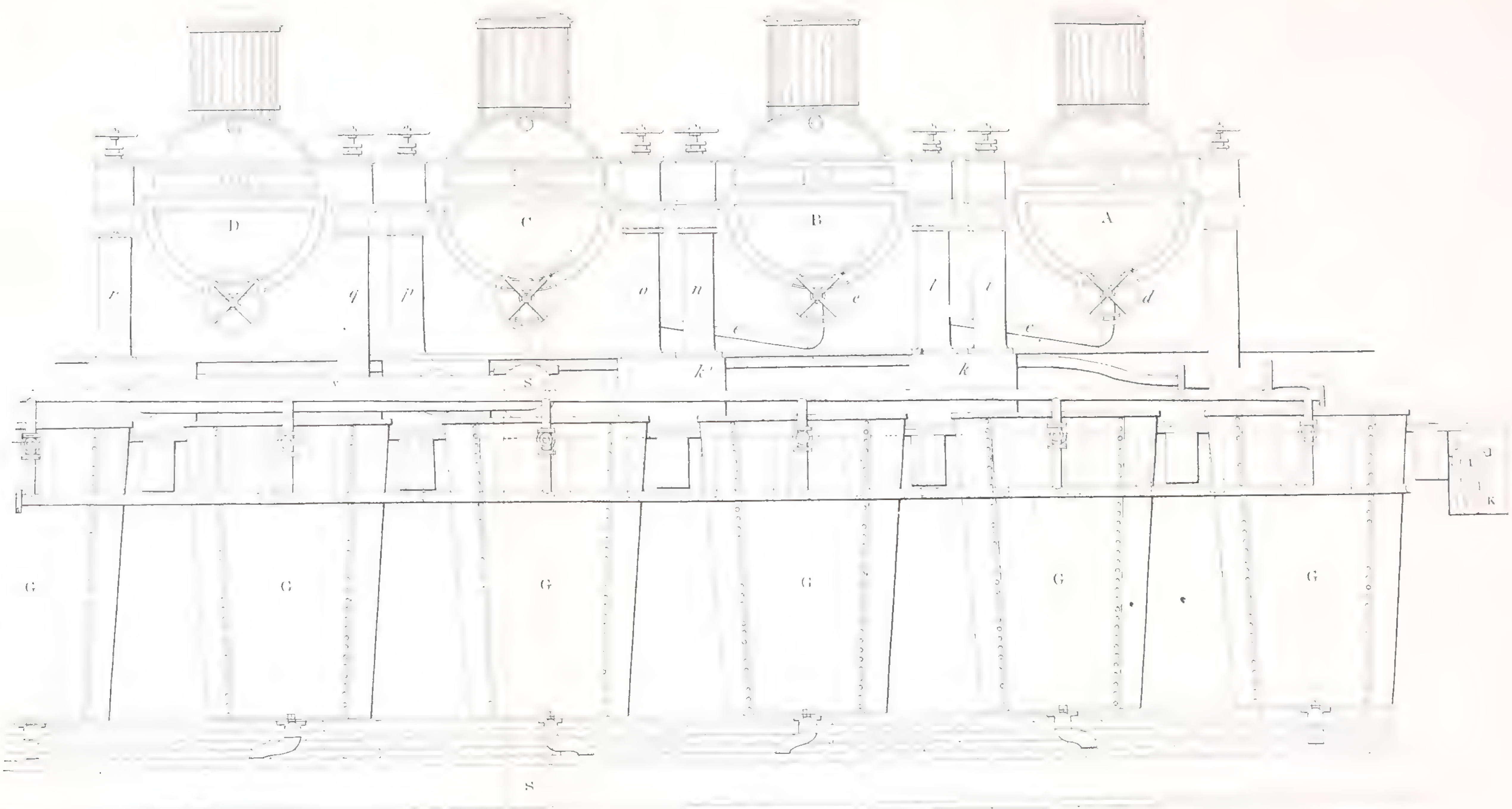
Fig 58

Fig 53



Ackerman's Lith. 120 Fulton St. N.Y.

Fig. 59



Ackermans Lith. 1.. Fulton St. N.Y.

Norbert Rillieux's *Four Pan Apparatus*

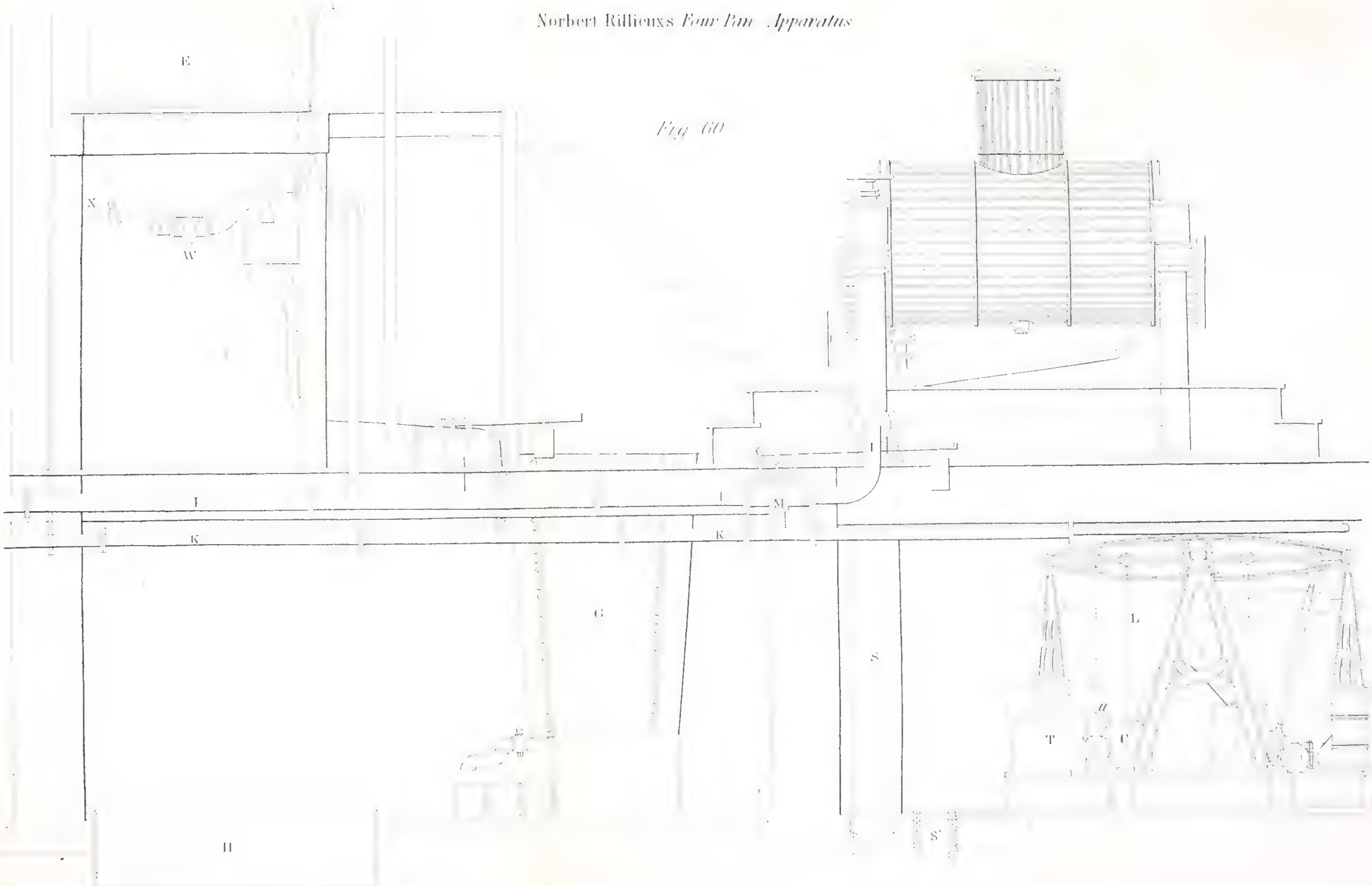
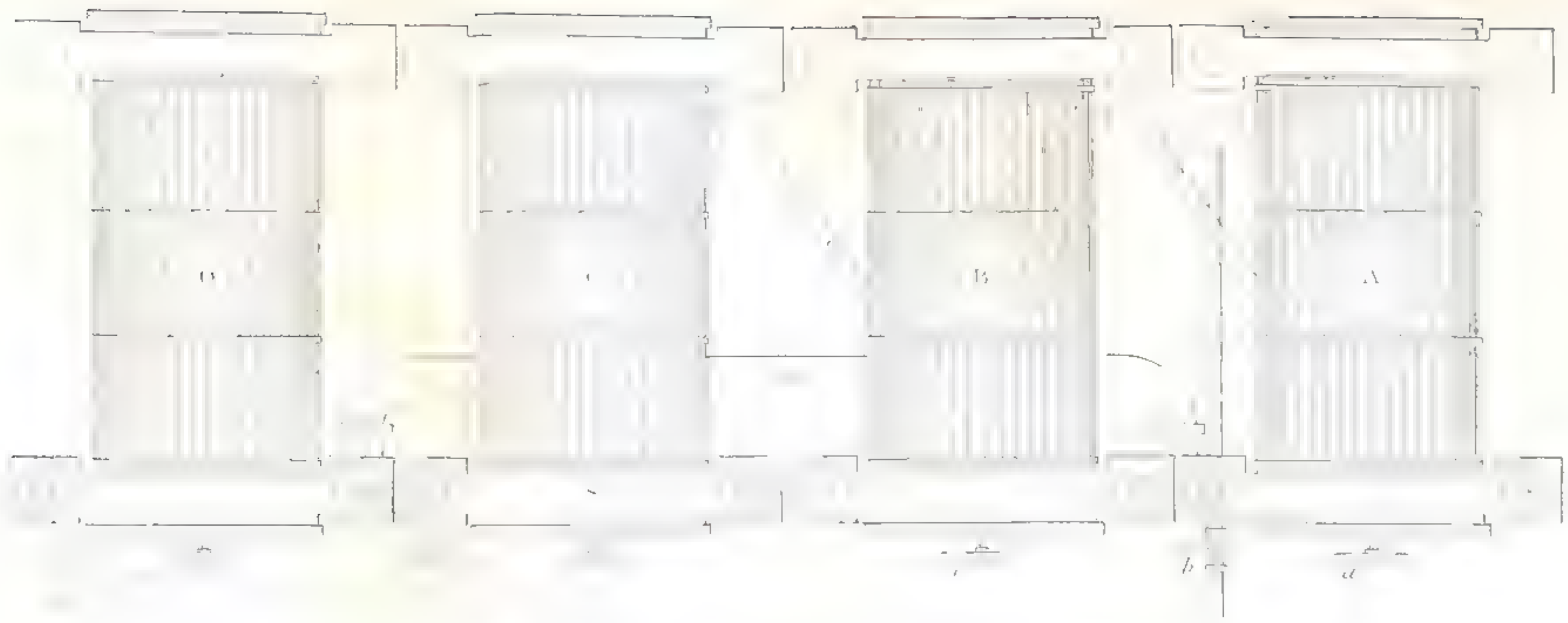
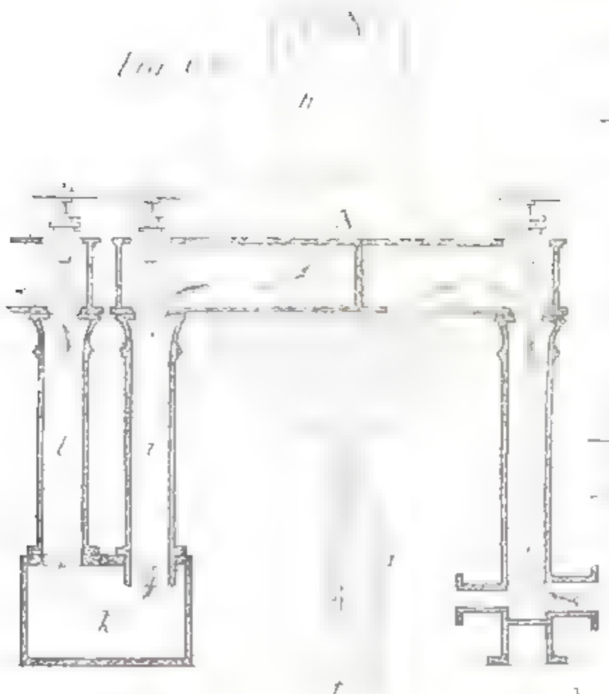


Fig 61



Vernet Rilhoux's

Fig 62



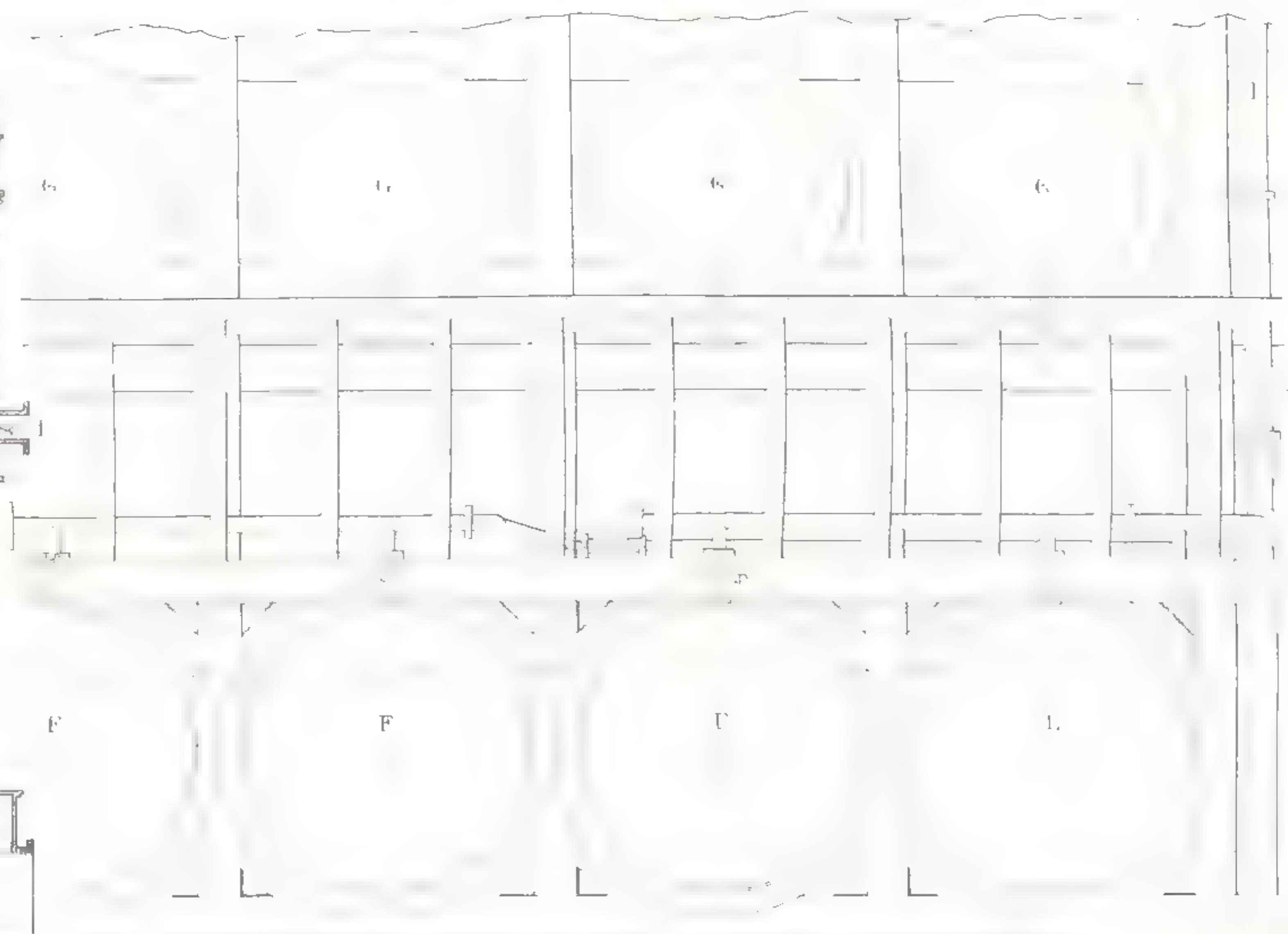
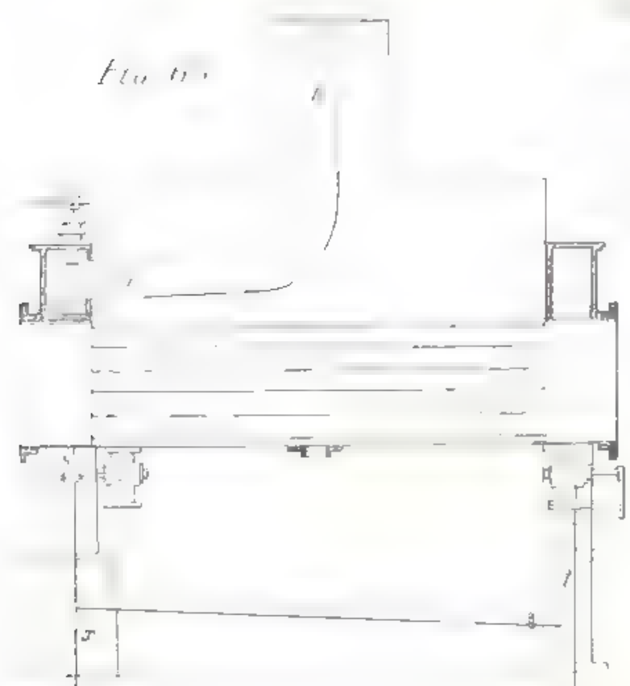


Fig 63

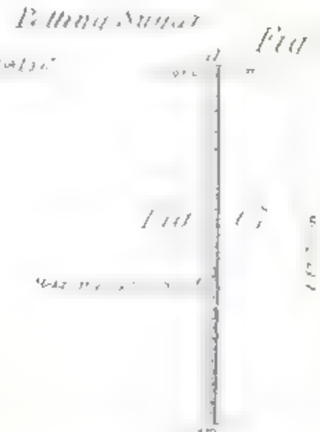


John De Breton Filling Sugar

Fig 1

Fig 66

Fig 2



J Benson & J Days impt in Sugar Pans

Fig 64

Joseph Hards impt in Machinery for Separating Liquids from Sugar &c

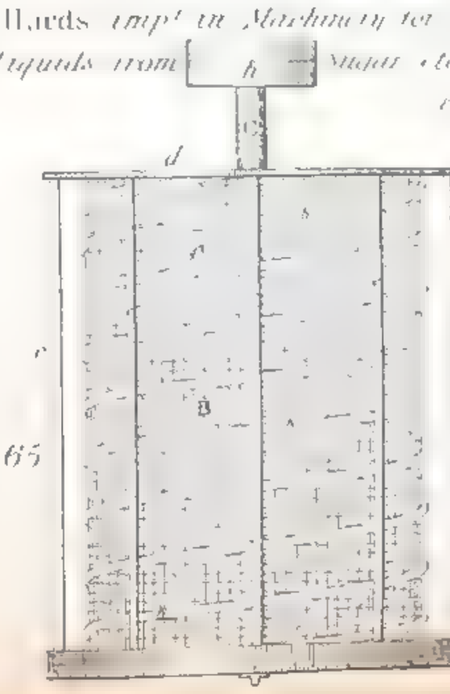


Fig 65

Ch. Fleischmann

Butler & Ilman